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Electricians

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DYNAMO-ELECTRIC DANGERS.

I'm a keen amateur electrican ;
I like to give people a start ;
So went to the new Exhibition
Of Electrical Science and Art.
British, Gallic, Italian, Germanic,
Yankee notions, moreover, and means
For all sorts of arrangements galvanic,
And of dynamo-electric machines.

Now it can't be too often repeated,
That if people don't take proper care,
Circuit wires, apt at times to get heated,
Wax red-hot now and then—so beware !
Where the lights to which gas are as rushlights
Were by night turning darkness to day—
Siemens, Edison, Jablochoff, Brush lights—
I wandered, exploring my way.

Apparatus, a little short-sighted,
As I stooped on, betwixt wire and wire,
In connection, my watch-chain, ignited,
In a wink set my waistcoat on fire.
Then the stem of a lamp, which, to work it,
Had a wire laid below to the fore,
I grasped, and completed the circuit,
Intervening, in person, through floor.

Dash my buttons, just didn't I holloa !
That is, try all I could to cry out ;
But a feeble moan only would follow
My fruitless endeavors to shout.
And my muscles were paralyzed nearly,
All throughout me ; my heart was oppressed,
And my lungs acted on so severely,
I had scarce any breath in my chest.

My face was convulsed and distorted,
And contracted so hard was my hand,
That a friend, to my help who resorted,
Couldn't loosen it off the lamp-stand.
But to strike him a happy thought chancing,
He lifted my legs from the ground,
And broke circuit, whence sparks of flame glancing,
Burnt my hand while its gripe was unbound.

I had had a charge sent right slap through me
That ten lamps was then serving to light ;
And the current that very nigh slew me
Being stopped, put out eight of them quite.
Mid electrical works ye who wander
Mind you how their machinery behaves,
And my pitiful story well ponder,
That you mayn't be shocked into your graves.

—*Punch's Almanack.*

Electric Lighting.—X.

In order to fix in our minds this most important property peculiar to ring armatures, let us analyze the conditions again, in a slightly different way. Let us suppose that instead of a ring (Fig. 36) we place a straight bar of iron between the poles *N S* of the field magnets. Then the lines from one pole *N* would all gather into the end near that pole and follow the iron, to emerge from its mass at the other end and enter the other pole *S* of the field. A piece of iron thus placed in lines of force in a magnetic field is usually spoken of as an induced magnet, as we found in studying the properties of lines of force, and when thus considered, its north pole (*N'*) would be opposite the south pole (*S'*) of the field magnet, and *vice versa*. Now if we were to bend this induced magnet until it formed a semi-circle, with its ends still remaining opposite the poles of the field magnets, it would still be the main path for the lines of force in that field, for they would be urged by its concentrative power to go out of their course and to follow its substance, in consequence of which the space inside the semi-circle would not be as intensely magnetic as before. In the Pacinotti or Gramme ring, we have, in reality, what is equivalent to two such semi-circles ; half of the lines of force follow one, and the rest follow the other, on their way from one pole to the other. Our ring now may be regarded therefore as an induced magnet whose south pole (*S'*) is opposite the *N* pole of the field, and whose north pole (*N'*) is opposite the *S* pole of the field.

In a straight bar magnet the lines of force change their course at the middle of the bar (see Fig. 1), and in slipping a loop of wire over it from one end to the other, the current will reverse at that point, as will be remembered on glancing at Fig. 20. The same thing also occurs here, in each of these two imaginary bent magnets, and there is a point midway in each of them (*A* and *B*) where the induction becomes reversed.

We scarcely need to be told this, if we have borne Fig. 35 in mind, for that spectrum shows plainly enough that no lines of force are cut at those points, and that the reversal must take place there.

When once the function of the ring is well understood the action of the Gramme armature will be easily explained. If we take an experimental loop, as in Fig. 20, and place it around the core of the ring at *A*, for instance, then slip it around the ring or else rotate the ring in the direction of the arrow, we will find that from *A* to *B* the current will be in one direction. At *B* it will be reversed and then it will continue to be of that direction as far as *A* where it will again resume the same direction as before. Of course, if we multiply our loop by using a coil of many turns instead of one, the electromotive force of the induced current will be increased, which means a stronger current in the same circuit. The whole ring could thus be wound with coils of many turns, but for simplicity we will suppose that each coil has only one turn. This is connected with the adjacent ones, as in the Pacinotti armature, and in this case the ring will look as if wound all around with a helical twist, as in Fig. 36, the ends being joined so as to make one continuous circuit allaround. Then on moving the ring the induction in all the turns on the left-hand side (*A S' B*) of the ring will be in one direction, which is such, say, that the positive direction of the current will be towards the upper collector *X A*. Now if there were no induction in the loops on the right side also, then the current from the induction on the left side would not all pass out at the collectors, but would partly pass around on that side until it came back to *B* again, in that way completing its circuit. But the induction on the right side is opposed in direction and tends to urge a current around the other way; so if the number of turns of wire on each side is equal their electromotive forces will be equal and these sides would balance each other, as was explained in the last article by the analogy of the two water pipes.

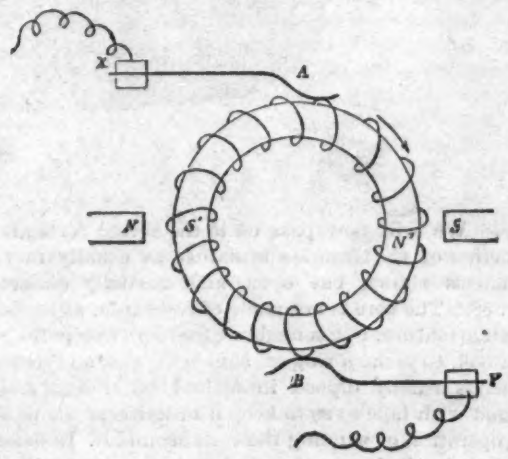

FIG. 36.

Here the collectors at *A B* are favorably placed so as to make a common outlet through which both these electromotive forces can produce a current together. It must not be inferred, however, that the electromotive force of one-half of the armature thus acting on the external circuit in conjunction with the electromotive force of the other half of the armature will give rise there to an electromotive force twice as great, or that, indeed, the electromotive force will be at all greater than if only one side of the armature were subjected to inductive action. Let us explain this further by another analogy. If we had two or any number of reservoirs of equal "head," all delivering water to a fountain by means of a common pipe connecting with each, the pressure on that main pipe would not be greater than if we had only one reservoir connected

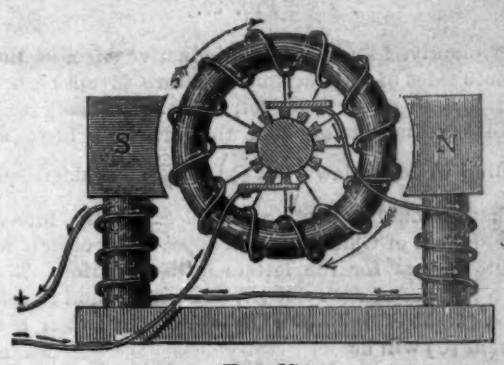

FIG. 37.

thereto, because the pressure depends on the absolute difference of level between the surface of the water in the reservoir and the water in this pipe. If we could pile one reservoir on top of the other, so as to increase this absolute difference of level, then the pressure would be doubled. So in this case. The pressure or electromotive force in the external circuit is due to the absolute difference of potential between the two points *A* and *B*. The potential in this case is highest at *B*, for we assumed that the currents flowed from that point towards *A* on both sides ; and consequently the lowest potential must be at *A*. Now, since the potential at *B* is the same for both, and likewise at *A*, and as the conditions (resistance, etc.) are supposed to be identical in each side, it is clear that the absolute difference of potential (E. M. F.) must be equal in each side and that it would remain the same in each, independently of the other. Now if we connect these two points *A* and *B* by means of a wire, or by means of the external circuit, it is evident that the electromotive force in that part of the whole circuit will be that due to the difference of potential between *A* and *B* also, and as we have just shown that these potentials are not altered by stopping the inductive effect on one side, it is clear that the electromotive force is the same in the external circuit as it is in the internal circuit in either branch. In other words, we have here two reservoirs of equal electromotive force, both delivering current into one common outlet, the external circuit. The two halves of the armature are in this case connected in multiple circuit, just as when two galvanic cells are connected by their like electrodes. If we could connect these two sides "in series," then the electromotive force of the one would be added to the other and the electromotive force of the current in the whole circuit would then be twice as great as that of either portion.

Nevertheless, although the division of the Gramme arma-

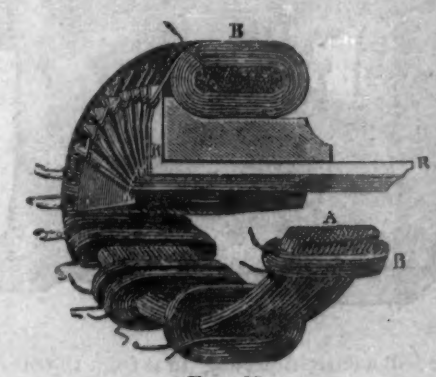

FIG. 38.

ture into two parallel circuits does not give an electromotive force as high as would be obtained if these two parts were joined in series, it affords an advantage which, practically, more than compensates for it. On referring to Ohm's law, we will recollect that the current in a given circuit can be increased just as well by lowering the resis-

tance as by increasing the electromotive force. Now in this case we have a current of given electromotive force passing through a divided or multiple circuit, made up of two equal portions of the windings of the armature. The consequence is, as explained under Ohm's law, that the resistance of both these branch circuits combined is only half of that of each taken alone. Therefore, although the

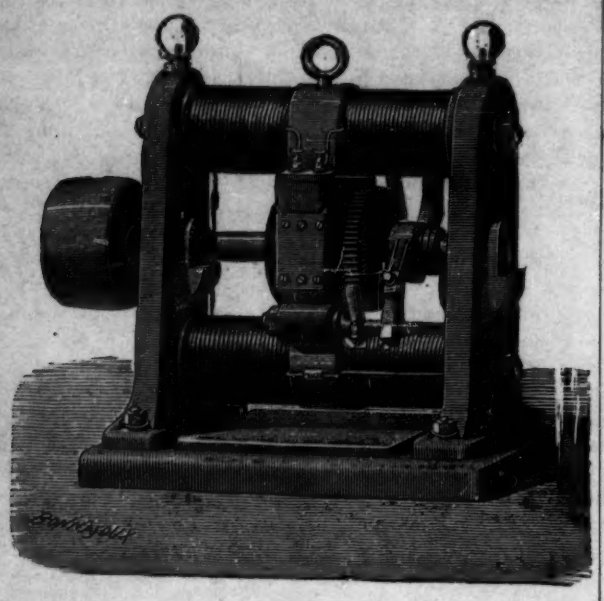

FIG. 39.

electromotive force due to the inductive effect of the field on both sides of the Gramme armature is not higher than that due to either side, yet, as their combined resistance becomes reduced to one-half, the current is increased, according to Ohm's law $\left(C=\frac{E}{R}\right)$ to the same degree precisely that it would by doubling the electromotive force. This consequence of Ohm's law will appear very clear if we substitute figures for the letters in the equation. Thus, let the resistance of each side (R) be 20 ohms, and the electromotive force of induction (E) be 100 volts; then the current (C) will be

$$\frac{100}{\frac{1}{2}20}=\frac{100}{10}=10 \text{ volts.}$$

On the contrary, let us see what would have been the effect of connecting the two sides in series:

$$\frac{100\times 2}{20\times 2}=\frac{200}{40}=5 \text{ volts.}$$

Evidently it would have been a real disadvantage instead of an improvement. Why? Because the resistance in this case is equal to twice each side instead of only one-half, or four times as much as in the first case. The electromotive force is doubled, it is true, but the resistance is quadrupled, which is equivalent, in fine, to reducing the electromotive force by one-half, and so the current would be only half as strong. It is true that the resistance could be lessened by making the wire larger on the coils of the armature, but more space would be required to contain it, and the winding would not be so convenient. On the other hand, this division of the circuit in the Gramme ring permits us to make use of very fine wire, without too much increasing the resistance, and thus to obtain a larger number of turns in small space, and consequently a high electromotive force.

We can now return to the action of the Gramme armature. Remembering that all the turns are connected into a continuous circuit around the ring, we can see that when one of these turns approaches the neutral point A (Fig. 36), where there is no induction produced in it by the field,

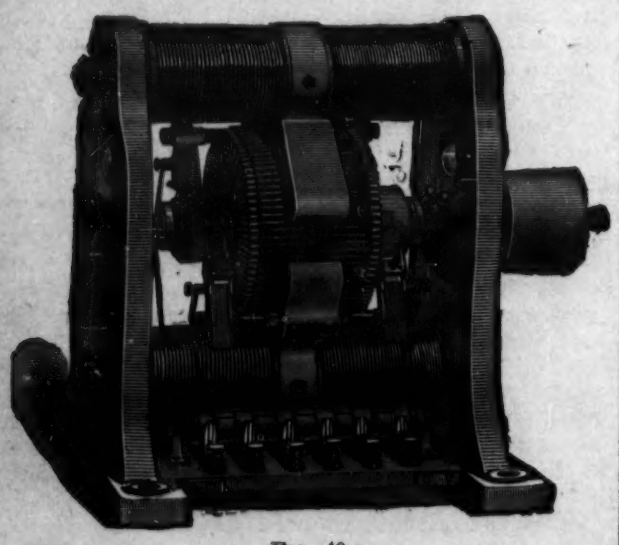

FIG. 40.

there is still a current passing in it from the other coils on that side, which passes to the collector at A. This idle coil itself then passes under A, and there it begins to be acted upon by the field of force on that side, and contributes its share to the electromotive force and current in that half of the armature. Of course the same thing takes place at B. Thus, although the coils keep on continuously shifting from side to side of the field, and although the current in them is actually reversed twice in a complete revolution, yet the number is always equally divided on each side at any moment, and they always give a current in the same direction on each side, so that when once we adjust the collectors at the neutral point the current will remain constant.

Fig. 37 shows a more practical application of the principles of the Gramme machine. The ring is wound with twelve coils (each represented by one turn), and at the point of junction between one coil and the next there is a connection with a segment of the commutator, which has therefore twelve segments. In this way the collector may touch the coming segment before leaving the other entirely, and the current from the coils which are in full activity can find its way to the external circuit at all instants during the revolution of the ring, and we realize in this manner a practically unbroken current. It is evident that the collecting brushes should touch the commutator at points exactly opposite to each other, in order that the number of coils in either half may remain constantly balanced evenly. The field pieces of the magnets are usually hollowed out, so as to let the armature revolve as closely as possible, as in the Pacinotti machine. The current from the armature is made to pass through the field magnet circuit on its way to the external circuit, in accordance with the well-known "dynamo" or accumulative principle already explained. There is an error in the engraving, however; the connections ought to be such that the current would pass around the S core in the other direction, for according to the rule for determining the polarity of electro-magnets, this pole would be an N pole also, in the figure, as on the other side.

Such are the principles of electric generators with ring armatures, and if we now refer back to the description of the Pacinotti machine, given in the previous article, we shall find that it agrees in every respect with these principles. We will now pass on to the actual form and construction of the Gramme armature as usually met with, which is shown cut open and partially dissected in Fig. 38. The core is not made of solid iron, as in the Pacinotti armature, but is made of fine soft iron wire wound in a reel, to make a ring of sufficient size and thickness, which is usually dipped in melted tar or resin and then wound with tape so as to keep it in uniform shape during the operation of winding the coils around it. In describing induction coils it was shown that by making the core of the primary coil of a bundle of fine wires rather than of solid iron, the polarity could be reversed more rapidly. This reason holds good here also, and furthermore it is found that when the core is thus made of wire it does not become so much heated during the action of the machine. This is because the lines of force act inductively on the iron and tend to produce local currents in the mass of the iron itself, which give rise to heat. This heat is one of the greatest sources of loss in the power obtained in dynamo-electric machines, as equivalent for the power applied, and will receive special consideration when we come to the question of economy. The coils B are wound around the core A; they are all of precisely the same length and occupy the same space very close to each other, so as to cover the core entirely. The ends of each coil are connected to the adjacent ends of the continuous coils so as to form one circuit, as shown in Figs. 36 and 37. At the point of junction between two coils, there is an L-shaped strip of thin copper R R, which strips are destined to form the commutator segments, the brushes touching their edges at the right-hand side of the armature. They all close in towards the centre like the spokes of a wheel, being kept from touching each other by insulating material, and they leave a circular space in the complete armature, for the shaft on which the armature is to rotate. When the number of sections or "bobbins" on an armature is very small, then the fluctuation is much more apparent, as each in turn passes the neutral line. Thus, with only 6 bobbins on each side, the fluctuation would be $\frac{1}{6}$. For this reason the number is usually increased, and in the ordinary type it ranges between 30 and 64. In this case the sections are very flat, and the commutator segments are very thin, being separated by the thinnest insulating space. Fig. 39 shows the usual form of the Gramme machine. The field magnets are made of solid round cores wound with wire. The upper and lower cores on the left side being magnetically continuous with each other through the iron frame-work of the machine on that side, may be looked upon as forming a U magnet, the cores on the right-hand side also forming a similar magnet. Now the current is made to pass through each of these magnets in such a way that the N pole of both is at the same field-piece in the centre, either above or below, and the S pole at the other field-piece. These field expansions are turned out, and inclose the armature almost entirely, and are usually firmly fastened together by plates of brass or other non-magnetic material. The rest of the machine may be readily understood from the figure.

The Gramme machine has received such a variety of industrial applications, that naturally it became modified in several ways. Thus, in order to make the magnetic field more powerful, each U magnet was sometimes made of two or even three branches or cores running into each field-piece. Fig. 40 shows a modification which was extensively used in France. There were two sets of the commutator strips, and the coils of the armature were connected in two distinct series, every alternate bobbin being connected to one, and every other to the other commutator. This made the ring equivalent to two distinct armatures, and the two currents, produced and separately collected by distinct brushes, could be used either in connection with each other in various ways, or independently, for separate purposes, the connections being controlled by a convenient switch or commutator on the base of the machine, as seen in the figure. Another very interesting type, to the experimenter, particularly, is the small magneto Gramme machine (Fig. 41), where the armature is rotated by hand in a field of force produced by a laminated permanent magnet with soft iron polar extensions. There is scarcely a laboratory in Europe that does not have a machine of this type, and in truth they are of the greatest convenience. There are a great many experiments which would be passed by, because of the trouble of setting up a battery of a dozen cells to be used only for a few moments, where this machine comes into play with advantage. Usually the armature is wound double as in Fig. 40, one series being wound with large wires of a few turns in each bobbin, so as to give a low internal resistance and to deliver a current of great volume through a circuit of small resistance, while the other series is made of many turns of fine wire, so as to give a high electromotive force to overcome high resistances.

C. O. M.

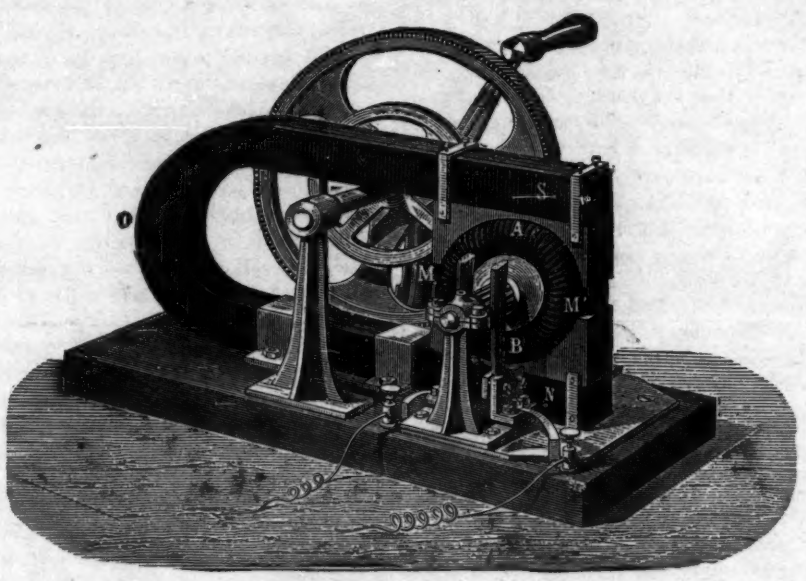

FIG. 41.

A NEW APPLICATION OF ELECTRICITY.—Ralph Corbit, an ingenious 12-year old boy of Honeybrook, Chester County, Pa., has devised a novel plan of getting rid of the rats which infest his father's cellar. He has constructed out of old fruit jars a battery of three Leyden jars, which he connects and places upon a large iron plate which touches the tinfoil on the outside. The bait is so arranged that when the rat steps upon the plate and seizes the bait he at once makes the connection between the outside and inside of the jars, and they are discharged through his body, killing him literally as quick as lightning. He charges the jars by means of an electrical machine, also constructed by himself. He ran a couple of wires through the floor to the cellar from the room above, and as soon as he would hear a rat squeak he would immediately recharge the battery. The first time he put the machine in operation he slaughtered twenty-five rats in a space of three hours, and in two days the cellar was entirely cleared of the pests.

The Telegraphers Mutual Benefit Association.

THE HISTORY OF A WORTHY INSTITUTION.

The association of which we propose to give a sketch is one of the most creditable outgrowths of the feeling of brotherhood that has always existed among the telegraphists of America. It is an organization that has done a vast amount of good, not only by alleviating distress, but by cementing and strengthening the fraternal feeling that called it into existence, and by rendering more cordial the relations between employers and employés.

The Telegraphers' Mutual Benefit Association, at first known as the Telegraphers' Mutual Life Insurance Association, was organized on Oct. 22, 1867. The credit for the first suggestion of the formation of the association is due to Mr. David R. Downer, now chief operator of the Western Union office in the Produce Exchange of New York city, whose attention was drawn to the subject by an account published in the New York *Times*, of the excellent work performed by a similar association of the policemen of New York. Prior to this time there had been numerous cases of severe distress among the families of telegraphists carried off by death, and it had been customary in such cases to pass around subscription papers among the operators—a generous but crude way of dispensing relief. Mr. Downer, impressed with the need of some better method of alleviating the distress and helping to tide over the dark hours caused by the frequent inroads of the grim reaper in the ranks of the profession, saw that an organization such as that described in the *Times* would be a decided improvement upon the subscription-paper method. He laid the proposition before Mr. James D. Reid, who entered heartily into the project. The matter was discussed by these gentlemen with a number of the operators and clerks connected with the main office of the Western Union Company, then at No. 145 Broadway, and a call for a meeting was issued, to which were attached about thirty-five signatures.

At this preliminary meeting, held at 145 Broadway, on the evening of Oct. 12, 1867, Mr. B. A. Squires presided, and Mr. Downer acted as secretary. Mr. Walter O. Lewis read a paper on the subject of life insurance among telegraphists, and a committee, consisting of Messrs. Reid, Downer, Squires, Lewis, George Durant, T. P. Scully and William H. Hill, was appointed to draw up articles of association and obtain signatures to it.

On October 22, in pursuance of a call issued by this committee, a second meeting was held. The committee submitted a plan which was adopted as the basis of organization, and reported that 125 subscribers had been obtained. Mr. Reid was chosen for treasurer of the association, Mr. Downer secretary, and an executive committee was elected, composed of Messrs. Reid, Downer, A. S. Brown, W. O. Lewis and W. H. Hill. In accepting the office of treasurer, Mr. Reid made a brief address, in which, after thanking the members for the expression of their confidence, he spoke of his long experience in telegraphy, and of the kindliness of feeling that had prevailed in the earlier days of the profession, among all classes of employés, from the messenger to the highest official, and which he had always aimed to cultivate. The combination of old companies, and the formation of new, had done much to disturb the spirit of good fellowship between the employers and employed, but he hailed the formation of this truly benevolent association as an omen that the old state of friendliness was about to return.

The office of president of the association was not created until some years later.

Of the original 125 members, 58 are still in the association. The first certificate was issued to Mr. Jere. Borst, who with prophetic instinct foresaw the brilliant future of the association and sought that honor. The accomplishment of this desire seems to have satisfied Mr. Borst's ambition, for his name does not appear subsequently in the records of the association.

Once organized, the growth of the association was steady and rapid. The name of the treasurer, so widely known and respected among telegraphists everywhere, was a guarantee of the successful administration of its affairs. The deep and active interest taken by Mr. Reid in this congenial work, and the influence which he was able to exert personally and through the columns of the *Journal of the Telegraph*, which he then edited, contributed greatly to the success of the association. In the words of a resolution unanimously adopted by the members in 1872, on the occasion of Mr. Reid's resignation of the treasurership: "To him more than all others the association owes its prosperity and the firm basis upon which it stands."

To Mr. D. R. Downer secretary for the first two years, fell the onerous task of organizing the details of the association, establishing districts, etc. None of the officers received any compensation for their services, except the satisfaction of doing a benevolent work.

The following table, giving the membership at the end of each fiscal year, exhibits the steady growth of the association:

Year.	Membership.	Year.	Membership.
1868	316	1876	1,400
1869	575	1877	1,822
1870	781	1878	1,886
1871	788	1879	2,016
1872	978	1880	2,138
1873	1,230	1881	2,145
1874	1,206	1882	2,324
1875	1,269	At the present time	2,354

The method of the association at first was to make an assessment, upon the death of a member, of one dollar on each of the remaining members, the sum so raised forming the amount paid to the heirs of the next deceased member. This plan was afterward modified as mentioned further on. The first member whose heirs received a benefit from the association was Mr. Seba B. Christie, the holder of certificate No. 224. who died in New York, on July 18, 1868, the amount paid being $274.

The late William Orton, president of the Western Union Company, was a member of the association, holding certificate No. 1,298. Mr. Orton took great interest in the welfare of the association. He attended its annual meeting in 1873, and delivered an address, in which he said: "No one realizes more fully than I do how much the prosperity of the company over which I have the honor to preside depends upon the loyalty and fidelity of its employés. No management would be entitled to the respect, loyalty and fidelity of such a body of men as, I am proud to say, compose the force of the Western Union Company, if it did not take some fitting opportunity to testify, not merely its respect for them individually, but its sympathy with them in the common affairs of life. So far as I can do so, I wish now to earnestly represent and express to you how much the company appreciates the integrity and fidelity of its men, and how much we attribute to them that great measure of success that has attended the progress of our business for the last few years. I have not come here officially to make any suggestions, but in my capacity as a member of the association, to contribute, so far as I am able, by way of suggestion and advice, as I may be invited so to do, toward making the association a success. Yet, if I can do anything in my official capacity—anything on the part of the company—toward that end, I pledge to you to continue my earnest efforts and good offices in that behalf."

Six times, by Mr. Orton's influence, the Western Union Company showed its appreciation of the value of the organization by the presentation of important amounts, which greatly relieved it in seasons of peril, aided its growth and strengthened its position. Over $1,800 was thus presented by the company. It was also through Mr. Orton's advocacy that benefits were limited to $1,000 each, and the reserve fund was created, provisions which have contributed very much to the success of the association.

In 1879, Mr. Reid, then president of the association, made an application to the Western Union Company in its behalf, representing that on account of the heroism of several members in that company's service, who had volunteered to take the places of telegraphists stricken down by yellow fever in the South, and had sacrificed their own lives, the death roll had been largely increased, and that some consideration was due the association therefor. The company generously responded by an appropriation of $2,000 for the benefit of the association.

The association has passed safely through the trying ordeals of several epidemics, the most severe of which was the one of 1878, above referred to, during which seven members fell a prey to the dreaded yellow fever. A constantly menacing foe has been that bane of telegraphists, consumption. An examination of the death record shows no less than 82 deaths, out of a total of 211, or the enormous proportion of 38 per cent., to have been due to that disease. This has arisen from the fact that the primary motive of the association was not a business but a benevolent one, and hence medical examination of candidates for membership was not required. It having become apparent that to continue this course would impair the efficiency, if not imperil the existence, of the association, medical examinations are now required, and have been for several years. This feature has greatly strengthened the association, and it is now probably the strongest organization of its kind in the country. There can be no cheaper one of equal security, for its expenses are limited to simple necessities. The work of its officers and agents is entirely a labor of love.

During the sixteen years of its existence the association has paid 211 claims, the entire disbursement for this purpose amounting to very nearly $200,000. The suffering it has relieved cannot be told. In many instances the payment of the association has been the only ray of light to dispel the gloom of utter destitution.

In 1879, for the purpose of providing additional insurance to any members desiring it, a second division was established. The membership of the second division at the present time is 144.

For the success of the association and for conscientious and gratuitous labor in its behalf, credit is due, in addition to the gentlemen already mentioned, to Messrs Gerritt Smith, A. B. Chandler, W. K. Applebaugh, William Holmes, R. H. Rochester, J. M. Crowley, C. H. Summers, J. B. Van Every, T. G. Singleton, W. A. Schram, A. H. Watson, J. T. Alleyn, Dr. J. O. Green, F. A. Armstrong, H. C. Robinson, R. W. Pope. J. N. Ashley, James Merrihew, C. S. H. Small, F. W. Jones, Samuel M. Taylor, the present treasurer of the association, and a host of gentlemen throughout the country who have performed with fidelity the duties of agents of the association, some of them for years.

Among the names of those whose heirs have received benefits from the association are many widely known among telegraphists: William Orton, president of the Western Union Company; James N. Ashley, of the *Telegrapher* and *Journal of the Telegraph*; Fred. J. Grace, editor of the *Journal of the Telegraph*; Calvin T. Sellers, superintendent of telegraph, Philadelphia & Reading Railroad; J. R. Dowell, who was general superintendent of the Confederate telegraph lines in the South during the war, and others.

The present president of the association is Mr. Clarence Cary, head of the law bureau of the Western Union Company. Mr. A. R. Brewer, secretary of the same company, is secretary of the association. Despite the arduous duties of these gentlemen in connection with their official positions in the Western Union Company, they take a warm and active interest in the affairs of the association. We regret that their portraits, which we had intended to give with this article, have been delayed by the engravers, and have to be deferred to another issue.

The following named gentlemen are the present agents of the association. Any one connected with telegraphy who may desire to join the association can obtain full information by addressing the nearest agent, or the secretary of the association, P. O. box 3,175, New York, N. Y.

Albany, N. Y., Charles C. King.
Albuquerque, N. M., D. Hardy.
Augusta, Ga., John W. Brown.
Atlanta, Ga., J. M. Stephens.
Baltimore, Md., R. J. Bloxham.
Bangor, Me., C. E. Bliss.
Bismarck, Dak. Chas. E. V. Draper.
Boston, Mass., E. B. Pillsbury.
Brooklyn, N. Y., A. J. Burton.
Buffalo, N. Y., J. W. Tillinghast.
Cheyenne, Wy. Ter., C. M. Wolff.
Cincinnati, Ohio, G. W. Sheppard.
Chattanooga, Tenn., Charles H. Skelton.
Charleston, S. C., D. M. O'Driscoll.
Chicago, Ill., J. Uhrig.
Cleveland, Ohio, H. L. Melton.
Columbus, Ohio, A. M. Paddock.
Crookston, Minn., Day K. Smith.
Davenport, Ia., N. F. Husen.
Denver, Col., W. B. Rundle.
Detroit, Mich., T. W. Hill.
Evansville, Ind., N. M. Booth.
Fort Benton, Mont., A. B. Keeler.
Grand Rapids, Mich., E. D. Benedict.
Galveston, Tex., David Hall.
Grafton, W. Va., A. T. Cline.
Harrisburg, Pa., R. B. Ziegler.
Halifax, N. S., Alex. E. Hoyt.
Hartford, Conn., S. B. Curtis.
Indianapolis, Ind., F. A. Moore.
Jacksonville, Fla., J. G. Thornton.
Jackson, Mich., D. S. Fleming.
Jackson, Tenn., Nelson E. Jacobs.
Kansas City, Mo., M. D. Wood.
La Fayette, Ind., H. E Doolittle.
La Porte, Ind., W. M. Noble.
Little Rock, Ark., E. C. Newton.
Louisville, Ky., Charles Smith.
Metropolitan Tel. & Tel Co., N. Y., W. G. Good.
Mobile, Ala., B. P. Shreve.
Montgomery, Ala., E. Winter.
Memphis, Tenn., H. E. Conley.
Milwaukee, Wis., D. H. Henshaw.
Montreal, Quebec, James Kent.
Nashville, Tenn., A. H. Stewart.
New Haven, Conn., J. M. Fairchild.
New Orleans, La., J. T. Alleyn.
No. Sydney, C. B., Nath'l Martell.
New London, Conn., G. W. Russell.
N. Y., L. Erie & W. R. R. (21 Cortlandt St., N. Y.), C. D. Reed.
Oil City, Pa., Frank Ross.
Omaha, Neb., C. Dwyer.
Pacific Telephone Co., San Francisco, J. I. Sabin.
Philadelphia, Pa., Chas. E. Wise.
Phillipsburgh, N. J., G. H. Grace.
Peoria, Ill., J. B. Hammatt.
Pensacola, Fla., C. L. Le Baron.
Pittsburgh, Pa., J. E. Palmer.
Poughkeepsie, N. Y., S. K. Rupley.
Portland, Me., C. D. Livermore.
Portland, Oregon, F. H. Lamb,
Providence, R. I., Jas. S. Hall.
Petersburg, Va., John W. Watkins.
Reading, Pa., W. H. Bunyeon.
Rochester, N. Y., A. J. Stoddard.
Reno, Nevada, Frank H. Macdonnell.
Sayre, Pa., H. H. Hamilton.
Scranton, Pa., R. O'Brien.
Syracuse, N. Y., Luther G. Field.
St. John, N. B., R. T. Clinch.
St. Louis, Mo., Geo. W. Brownson.
St. Paul, Minn., Geo. B. Evans.
San Francisco, Cal., A. P. Dubois.
Savannah, Ga., H. Griffith.
Springfield, Mass., W. J. Denver.
Springfield, Ill., W. W. Kelchner.
Southern Bell Telephone Co., John F. Reynolds.
Toronto, Ont., J. Lanskail.
Troy, N. Y., J. W. Spencer.
Toledo, Ohio, E. W. Fish.
Vincennes, Ind., Perry Hood.
Washington, D. C., W. H. Young.
Wheeling, W. Va., Jno. G. Tomlinson.
White River Junction, Vt., G. W. Gates.
Wellsville, Ohio, P. Bruner.
Worcester, Mass., E. W. Bradford.
Watertown, N. Y., D. Van Nostrand.

We are indebted to the officers of the association, and to its courteous clerk, Mr. George W. Wyeth, for access to the information here given concerning an institution which we trust will long continue to thrive and prosper, and be a credit to the telegraphic workers of America.

Decisions in the Cameron and Gould, and Hatch Suits.

Judge Arnoux, in the Superior Court of New York, on Dec. 29, rendered another decision unfavorable to Mr. Gould, upon the motion argued before him the week before, on behalf of the Mutual Union Telegraph Company to vacate an order granted by Judge Truax several weeks ago, upon the petition of Attorney General Russell, giving leave to bring a suit in the name of the People of the State in the relation of William H. Cameron and Jay Gould against the Mutual Union Telegraph Company, to vacate the charter of that corporation. Judge Arnoux decides to vacate Judge Truax's order granting leave to the Attorney General to sue. The grounds of vacating the order are the technical grounds that the petition was not signed by the Attorney General himself, and that references were made in it to papers not filed. Leave is given to the Attorney General to try again if he thinks best, and it is suggested that he give the defendants notice of his action.

On the same day Judge Arnoux rendered a decision in the case of Rufus Hatch against the Western Union Company and others. It enjoins any future dividends upon the stock declared illegal—namely, the $15,000,000—but allows the payment of dividends upon any portion of this stock which it may be impossible to distinguish from the legal stock, upon the directors or stockholders filing a bond of $200,000 to reimburse the treasury of the company if the Court of Appeals shall finally sustain the decision of the General Term. It also allows the plaintiff to move the Court to prevent the transfers of any of this stock that can be distinguished as part of the illegal issue.

STOCK QUOTATIONS.—Telegraph, telephone and electric-light stocks were quoted as follows on Tuesday and Wednesday, the first three being Wednesday's closing quotations:

Western Union Telegraph	81
Mutual Union Telegraph	24
American Cable	67
American Bell Telephone	184
Edison Electric Light	400
United States Electric Light	116
Fuller Electrical	31

THE OPERATOR
AND
ELECTRICAL WORLD,

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NEW ADVERTISEMENTS.

In the growth of our paper in circulation, size and general improvement, the value of its columns for reaching those engaged in electrical pursuits or interested in electrical matters has not failed to be appreciated by advertisers. In order to better enable our readers to notice anything new which advertisers may have to offer them, we shall henceforth give in this column a list of new advertisements as they appear in each number. The following will be found in to-day's issue:

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ANOTHER STEP FORWARD.

Nothing better illustrates the rapid advancement of science in electrical matters than the enlarged and handsome form in which THE OPERATOR appears to-day; and not the least part of the illustration is the change in its title, which necessity and truthfulness have forced upon us, to THE OPERATOR AND ELECTRICAL WORLD.

As the mouthpiece of the telegraphic profession we have during the past nine years made a record, the keen appreciation of which is best shown in the unwavering unanimity with which our efforts have been supported by the profession. But, from catching up and recording the spirit of our widespreading telegraphic enterprises, we have long since found the necessity for not only following the record, but for marching in advance and leading men on to new positions and new ideas; and, since THE OPERATOR has meanwhile grown to be an epitome of the electrical world, we should take pride in announcing that fact in its title.

Since THE OPERATOR was founded it has witnessed the most unprecedented growth of the telegraph; the invention of the telephone, and its extension to the most remote portions of the earth; the improvement of the electric light until its use has become almost universal; the invention of the quadruplex and the perfection of the duplex, both on cables and land lines; since then a single telegraph company in this country—the Western Union—as will be seen from the annual report of President Green, published in our Oct. 14th issue, has doubled the number of its miles of poles and wires, as well as of its offices, the figures being 71,585, 175,735 and 6,188 respectively, in 1874, and 131,060, 374,868, and 12,068, in 1882, and has increased the number of messages handled from 16,000,000 in 1874, to 32,000,000 in 1882.

Similar changes have taken place all over the world, and with all these vast improvements THE OPERATOR has kept well to the fore, in size, frequency of issue, scientific research and general information; and since it has grown to be a reflex of the entire electrical world, it is only proper that THE OPERATOR AND ELECTRICAL WORLD should put forth its claims in name as well as in fact.

The recent change from a semi-monthly to a weekly; the sweeping changes inaugurated to-day, in the increase of size and other improvements, and its hard-earned reputation as a cosmopolitan journal, should be sufficient guarantees for the future course of THE OPERATOR AND ELECTRICAL WORLD.

UNDERGROUND WIRES.

From the large number of patents issued in recent years by the United States Patent Office for methods of conveying electric currents underground, it is evident that the subject is occupying the minds of many inventors, while from the very limited extent to which these methods have been put in practice it is equally apparent, either that there is no demand for an underground system, or that by far the greater number of these inventions are of doubtful utility. An impression prevails generally that underground conductors for telegraph, telephone and electric light lines have become, or are rapidly becoming, a necessity, in cities, at least. This feeling obtains expression in the daily newspapers in assertions that the time has come when the pole nuisance must cease, and that there is no longer any valid excuse for not putting electric wires underground; it breaks out in municipal councils in ordinances to compel telegraph, telephone and electric light companies to put their wires underground, and in refusals to grant new companies permission to erect poles on the streets, and it has doubtless led to the inventive activity of which we have spoken.

Several years ago a report was circulated that the Western Union Telegraph Company was ready to pay a very liberal sum for a practical mode of conveying telegraph lines underground. To the uninitiated the problem seemed a simple one, and this report stimulated a number of inventors whose knowledge of the factors of the case was crude, to try for the prize. Hence, a number of patents were issued for underground cables, in which the only conditions sought to be fulfilled were the mechanical ones and the prevention of electrical contact of the conductors; and there have even been cables patented in which the mechanical requisites were ignored, the conductors being imbedded in solid glass.

But it was soon perceived that with the mechanical requirements fulfilled, and with the conductors perfectly insulated from contact with each other, something was still needed to make underground wires practicable for telegraphy, and particularly for telephony. Induction became a household word—that mysterious influence which passes from wire to wire through space, mocking electrical insulation.

It was not difficult to find a remedy for this kind of induction. It probably occurred to a number of persons that a metallic wrapper around each conductor, outside of its insulator, would effectually stop the passage of that influence from one conductor to another. So it does; but then a new trouble arises, consisting of a cause and an effect, the cause being known as static induction and the effect as retardation.

When one conductor is placed within another, with an insulating substance between them to prevent electrical contact, if the inner (primary) conductor is charged with electricity the outer (secondary) one will become electrified at the same time, its inner surface exhibiting one kind of electricity (the opposite in polarity of that with which the primary conductor is charged), and its outer surface the opposite kind. These electricities in the two conductors appear to exert a mutual attraction upon each other, and this tends to cause a retardation of the discharge of the inner conductor. In telegraphy this causes the signals to be drawn out so that they tend to run together. We recently described how this was avoided in the American Rapid Company's automatic system by reversing the polarity of the current after each signal. The same method has been found necessary in ocean cable telegraphy, where even with this aid the signals cannot be sent as rapidly as on aerial lines.

In telephony retardation causes the electrical impulses that represent the sound waves to blend, and the sound that is reproduced appears muffled or far off, the words ending with a kind of squeak. Up to the present time no means has been devised to overcome retardation sufficiently to admit of long distance telephony on underground wires. It is very questionable whether its effect is not such as to make it a serious obstacle even within the limits of a large city. A correspondent informs us in this issue that the new English telephone company purposes to use underground lines throughout London. We shall await the result of the experiment with interest. There are several inventors of underground systems in this country who claim that in their cables no difficulty is appreciated from retardation within distances sufficient to cover the limits of large cities, but their systems cannot be said to have been thoroughly tried. Inventors are always sanguine, and municipal authorities ought not to accept their dicta as justification for arbitrary mandates compelling telephone companies to put their wires underground.

The fact that in Germany a large part of the Government telegraph lines is underground is often urged as evidence that the method is practicable, but those who have examined the German system say that the rapidity of signaling is greatly diminished on those wires, and that they cannot be used for telephony. The French Government is now constructing a system of underground wires, which has just been completed between Paris and Lille, Nancy and Dijon, and we learn that they are working successfully, and without difficulty from retardation, owing to the use of very feeble currents and very sensitive instruments.

None of the remedies for retardation that we have mentioned as being employed in underground telegraphy are available in telephony, where the impulses succeeded each other with enormously greater rapidity. Hence, the injustice that would be wrought to telephone companies by municipal ordinances compelling the placing of wires underground is apparent.

But even if there were no technical objection to placing wires underground it is questionable whether anything would be gained by putting them there. The citizens of New York, who are having daily a painful experience in the obstruction of travel in the principal streets, caused by the constant tearing of the pavements to tinker at steam, gas and water pipes and electric light mains, would not, we should think, want to augment this nuisance by adding to these conduits the far more numerous telegraph, telephone and electric light wires. The worst that can be said of the poles is that they are offensive to the eye; but would it not be better to cultivate a spirit similar to that of the philosopher of the Cincinnati *Commercial*, who asserts that he likes to see the poles, because they indicate business and prosperity? Would it not be well to endure the poles, at least until our cities are threaded by a net-work of tunnels similar to those with which Paris is undermined?

IN our last issue we noticed a fatal collision of trains on the New York, Pennsylvania & Ohio Railway, near Jamestown, N. Y., occasioned by the alleged carelessness of a telegraph operator. It appears that the train dispatcher intended to hold train No. 32, eastward bound, at Kennedy until 31 and extra had passed, but some one omitted the words "and extra," so when No. 31 had passed Kennedy, No. 32 started on eastward and met the extra with the result described. The Jamestown *Journal*, commenting upon this unfortunate accident, remarks that the employment of young persons where mistake or neglect produces such terrible results, is not commendable, to say the least, and that men of steady nerves, cool heads, and mature experience should hold such positions of responsibility. That is very true, as we have remarked heretofore, but the railroad companies will never be able to get that kind of men for $35 or $45 per month, the usual rate of wages for railroad telegraph operators, and even an occasional $10,000 wreck does not seem to suggest to the managers the futility of this kind of economy.

TO SUBSCRIBERS to Vol. XIII. who have not yet renewed their subscriptions we are sending copies of to-day's issue, to let them see how the paper looks in its enlarged size and under its elongated name. All of these—as well as any non-subscribers who may see a copy of this issue—are asked to PROMPTLY send in their subscriptions for 1883. Remember that the paper is published WEEKLY, and that the subscription price is $2 a year; but that where FIVE or more subscribe together, they get the paper for a whole year, postage prepaid, for $1.50 each, and that where TEN subscriptions are sent at this low rate, an EXTRA copy for a year will be mailed free to the getter-up of the club. See advertisement, page 10.

THE Mutual Union Telegraph Company has achieved another victory over Mr. Jay Gould in the decison by Judge Barrett dissolving the temporary injunction granted to restrain Mr. John G. Moore and other stockholders of the Mutual Union Company from putting a majority of the stock of the company out of Mr. Gould's reach by tying it up in trust for five years. The young and vigorous company has thus beaten the wily manipulator at every point. It would be too much, however, to expect that this successful opposition would dampen Mr. Gould's eagerness to get control of the company. It is rather likely to stimulate him to renewed exertion, and it becomes a matter of interest to see what move he will try next.

THE different headings that have been engraved for THE OPERATOR have, we think, each been neater and handsomer than the one before it. The new heading, used for the first time to-day, as much surpasses any of the former ones as THE OPERATOR AND ELECTRICAL WORLD will endeavor to surpass the former record of even THE OPERATOR.

CORRESPONDENTS sending communications for the columns of THE OPERATOR AND ELECTRICAL WORLD which it may be desirable to have appear in a certain issue, will oblige us by mailing them so as to reach us not later than the Monday before the date of issue, and as much earlier than that as may be possible.

IT is hoped that readers will find much to admire in the changes and improvements introduced to-day. As they get used to the new size and the addition to the title, they will like them better, possibly, than they may at first.

THE unusual amount of extra work consequent upon the radical changes inaugurated to-day has prevented our getting ready this week as complete an index to Vol. XIII. as we desired. It will accompany next issue.

The Late W. T. Henley.

Mr. W. T. Henley, the distinguished telegraph engineer of England, whose death we noticed two weeks ago, was born at Midhurst, Sussex, and was brought up by his grandfather and his uncle, who were leather dressers, to that trade; but, not liking the business, at sixteen he went to seek his fortune in London. He began as light porter at a silk mercer's in Cheapside, and afterward worked in the docks as a laborer for some years. Meanwhile he taught himself the trade of a philosophical instrument maker, and when twenty-four years old he started in the business. He was employed by Professor Wheatstone in making his apparatus when he first brought out his electric telegraph, and assisted in all his experiments. Mr. Henley invented a magnetic telegraph, and formed a company which purchased the patent for £58,000 in cash and shares. He also connected the principal towns of the kingdom underground by digging a trench from London to Carlisle and from Dublin to Belfast. Mr. Henley also turned his attention to submarine cable making, and carried on a large business at North Woolwich, employing upward of 2,000 men. He made close upon 14,000 miles of submarine cables, a great part of which he laid himself. He was very early in the field with the electric light apparatus, having made some large machines for the Alliance Company of France in 1849.

Canadian Notes.

The funeral of Sir Hugh Allan, at Montreal, on Dec. 27, was largely attended by the general public. Among the many telegraphic people present were Messrs. O. S. Wood, Angus Grant and James Dakers.

During the past year the Canadian Pacific Railway Company has constructed and equipped 1,372 miles of telegraph. On Jan. 1, 1882, the company controlled in the western division only 132 miles of line. At present it has 1,504 miles of line in operation, with 168 instruments, requiring the service of 25 operators in addition to the station masters of all but the principal stations. The wages of the operators range from $60 to $75 per month, according to ability and length of service.

It is reported that a number of English and Canadian capitalists have an immense telegraph scheme under consideration, which also includes the laying of a cable from Ireland to Canada, and that at the approaching session of the Dominion House at Ottawa an act to incorporate the company will be asked for, and to permit it to lay a cable and build a telegraph line from some point on the west coast of Ireland or Scotland, by way of Greenland, Hudson's Straits, Hudson's Bay, Fort Churchill, Arthabaska Lake and the Peace River to some point on the coast of the Pacific Ocean, in the vicinity of Fort Simpson, with power to extend thence northwesterly to a point of junction with the Russian telegraph system.

Progress of the Edison Companies.

From a bulletin just issued to the stockholders of the Edison Electric Light Company, by President Eaton, bearing date of Dec. 20, 1882, we glean the following items relative to the progress of that company and of the Edison Company for Isolated Lighting.

In the first district of New York City the company is now lighting 225 houses, wired for about 5,000 lamps. Although the difficulties arising from the imperfect regulation of the engines have not yet been overcome, it is announced that not a moment's stop has occurred in the operation of the system since it was started, in September last.

The Edison Company for Isolated Lighting has declared a dividend of 10 per cent., payable Jan. 20, out of the profits of the first year's business. It is stated that this has been earned exclusively from the sale and installation of isolated plants, and that no territory or territorial rights have been disposed of. The total number of isolated plants up to the date of the bulletin is 153 plants, 29,192 lamps. Recent installations are in the residence of Mr. J. Pierpont Morgan, New York City, 385 lamps; the Bijou Theatre, Boston, 650 lamps; the Mississippi River steamer "Kate Adams," 120 lamps; the American Express Company's offices, New York, 250 lamps; the Mount Vernon Company's cotton mill, Baltimore, 400 lamps; Messrs. Fiss, Banes & Erben's worsted mill, Philadelphia, 500 lamps.

Orders have been received for the following installations: The Bay State Sugar Refinery, Boston, 150 lamps; the St. Charles Hotel, New Orleans, 150 lamps: Messrs. Whiting & Campbell's paper hanging factory, New York City, 60 lamps; Mr. A. Y. McAden's cotton mill, Lowell, North Carolina, 100 lamps; the Albion Paper Company's mill, Holyoke, Mass., 150 lamps; the Arnold print works, North Adams, Mass., 150 lamps; the Portage Straw-Board Company, Akron, Ohio, 130 lamps; Messrs. B. Fischer & Co.'s spice mill, New York City, 55 lamps; Messrs. Heywood Brothers & Co.'s chair factory, Gardner, Mass., 300 lamps; the York Manufacturing Company's cotton mills, Saco, Maine, 750 lamps; the United States Military Academy, West Point, N. Y., 60 lamps; Messrs. P. H. White & Co.'s dry-goods store, Boston, Mass., 500 lamps; the Mayall Rubber Company, Reading, Mass., 150 lamps; the Boston Chair Company's factory, Ashburnham, Mass., 150 lamps; the Grinnell cotton mill, New Bedford, Mass., 800 lamps; Messrs. Clark & Keen's woolen mill, Philadelphia, 200 lamps; the Stearns Manufacturing Company's machine shops, Erie, Pa., 150 lamps.

At Santiago, Chili, a small central station has been started, the current being distributed over two main conductors, one 650 feet long, the other 425 feet. The lights are distributed among twelve dry-goods stores, five large commercial houses, a large café and billiard room, and several other shops. Since the establishment of this plant the local gas company has supplanted the old gas burners with new ones, of enlarged capacity, free of charge.

The Action of Microphones.

Mr. R. D. Smillie, electrician of the National Telephone Company, Limited, writes from Glasgow to the *Electrician* questioning the correctness of the conclusions arrived at by Professor Blythe in his paper on this subject, which we reproduced from the *Proceedings* of the Royal Society of Edinburgh, in our issue of Dec. 16. Mr. Smillie says that experiments which he has made lead him to the conclusion that the microphonic action which takes place in a transmitter is due to the variable resistance of carbon, under various pressures, with a closed contact, and not, as the inference to be drawn from the paper in question would set forth, by a "make and break" or intermittent contact. He calls to mind Edison's tasimeter, in which a carbon button varies its resistance under the effect of pressure due to the expansion of a solid undergoing a change of temperature.

As the tasimeter button is sometimes composed of compressed lampblack, Mr. Smillie prefers to use the Blake transmitter, in which a hard carbon button bears on a platinum stud, to demonstrate his experiment. He thinks it improbable that vibrations could be imparted by the voice to the iron plate that would be capable of interrupting the continuity of the contact between carbon and platinum, when the iron plate is "damped" by a strong steel spring, and the carbon is kept "up to its work" by a force exerted by a spring of say 45 grains.

The method which Mr. Smillie adopts to demonstrate the effect of varying resistance is to connect up the primary circuit of a Blake transmitter with the Wheatstone bridge and a tolerably sensitive galvanometer, balancing the resistance. When a bristle from an ordinary hearth brush is pressed against the diaphragm, the needle of the galvanometer is deflected, and the greater the pressure put on the bristle the greater the deflection. On releasing the pressure of the bristle steadily the needle returns practically without variation to zero. On separating the carbon-platinum contact, the needle vibrates to the opposite side of the scale, thus showing that the effect in the first case was to diminish the resistance.

Mr. Smillie makes the following deductions from his experiments:

First—That the normal resistance of the carbon is diminished on pressure being applied within certain limits, which regains its normal resistance on the pressure being removed.

Second—The current will be proportionately increased as the resistance is diminished.

Third—Induced currents will be set up in the secondary coil by the variations of current flowing in the primary and in proportion to their intensity.

Fourth—That the variation of the primary current will be proportional to the vibrations of the diaphragm, which will in turn respond to the magnitude and intensity of the sound waves which impinge on its surface.

Therefore microphonic action takes place independent of an intermittent contact with or without matter filling the gaps.

Telephonic Peculiarities.

A writer in the New York *Times*, who has evidently given the subject careful study, gives some valuable hints for people who use the telephone. Most people, he says, seem to think that because they may be talking at a distance they must shout to render tones intelligible. When talking through the telephone, the conversation should be carried on in the ordinary tone of voice. Not only this, but the person speaking should stand not less than three and not more than eight inches from the transmitter. When one covers up the transmitter and bellows into the opening like a mad bull, the words at the point where they are received are simply a mass of sounds with no meaning. To speak too low would be an error, but it is one of which no one is guilty.

Another thing, people appear to be in a great hurry when talking into a telephone. The words run out as though issuing from a talking-machine, the crank of which was turned by a menial whose pay depends on the number of revolutions. The way to speak into a telephone is to talk deliberately, but not slowly to an unnecessary degree, and articulate clearly each word. It is just as easy to employ good plain English, which everybody can use, as it is to adopt mannerisms and inflections of speech. The telephone must be adjusted to the voice. As voices pitched in all keys are poured into the transmitter, the only thing that can be done in ordinary cases is to endeavor to strike a happy medium.

There is an arm back of the diaphragm against which the sounds are thrown. A thumb-screw enables the arm to be pressed down upon the carbon button which comes in contact with the diapbragm or to be loosened at will. Usually the diaphragm is adjusted to suit the voice of the inspector, who is accustomed to talking through the telephone, and thus is made to serve the purpose of every one. The telephone is a delicate instrument, and when set up for private use is generally adjusted to the voice of the person using it. If a person's voice is thin and piping the diaphragm is left loose, so to speak. The sound waves are light, and if the diaphragm were held tightly they would not move it sufficiently to produce the electrical movement. On the other hand, if the heavy chest tones are to be thrown into the transmitter, the arm must be screwed up somewhat tightly, otherwise the diaphragm would be made to jingle in its place by the violence of the sounds. It would send out over the lines confused noises, and the person speaking would not be able to convey his words or their meaning. Naturally enough, an American, as a rule, is more easily understood, at least through the telephone here, than the foreigner who has acquired the English tongue to a greater or less degree. In the first place, his pronunciation is more familiar. But this is not all. His syllables and sentences are clearer, and he takes more naturally, seemingly, to the telephone. The German, ordinarily sluggish and gutteral in speech, rouses to action when his mouth is before the transmitter. He talks as if he were talking against time, and pitches his voice in the key of C. This a peculiar fact noted by the telephone operators.

The German makes bad work of it, but when he leaves the telephone he resumes his wonted calmness and deliberate ways. The greatest trouble with the French and Spanish is the rapidity with which they talk. While their pronunciation may not be more correct than the Germans, it is usually more distinct. Dialects are quite difficult thoroughly to comprehend. The facial expression and explanatory movements cannot be seen, and only the plain words fall upon the ear, with nothing in the range of the vision to complete the explanation. The Irishman's brogue is so rounded off that it comes over the wire sharply and plainly. The negro is hard to understand on account of his long-drawn syllables and peculiar pronunciation.

There are some peculiarities about the telephone service that do not come under the ordinary observation. The letter "S" when sent over the wires sounds like "F." An inquiry came from the upper part of the city to one exchange down town asking if it had a subscriber named Fever. No such name could be found on the list. By accident the manager discovered that the name was Sever. He paid close attention to the sound of the letter "S" afterward, and was surprised to find that it invariably came over the wires "F." In figures, 27 can rarely be told from 37. Of the people who use the telephone the stammering man is the most agonizing to the operator or the person with whom he talks. His words sound as if some one had him by the throat and were choking the breath out of him. The syllables come by fits and starts, and as the distorted face of the speaker cannot be seen, the mind cannot take the meaning from the poor wretch's struggling efforts.

When the wires are crossed and half a dozen instruments are connected there is trouble all along the line. The people go talking to one another, under the impression that they are communicating to the operators in the central office. Their ire is excited, a war of words ensues, and only when the receivers are slammed on the hooks in righteous indignation does it cease. Time was—to everybody's relief it is past—when amateur vocalists used to howl themselves hoarse, and amateur musicians used to blow themselves breathless to show their accomplishments through the telephone to their friends a mile away. People have learned to put the telephone to substantial business purposes, and the receivers are hung on the hooks when any inspired genius starts to sing or play into the transmitter.

Of all the dreary monotonies, that of the telephone operators in the central office is the worst. It is "hello," day in and day out. That is the burden of their life. They put the receivers mechanically to their ears when annunciators drop, call out the numbers and repeat the movement over and over again. Young women are employed almost entirely in the exchanges. Men could not be induced to sit ten hours a day and respond to a call of "hello." When boys start in to learn to be operators they tire before they attain proficiency. Women are the only ones who will stick to the work. They are sober and trustworthy, and are contented with the pay they receive.

Following out the popular idea which has prevailed, the conclusion would be that their natural curiosity would unfit them for the duties. There is nothing that will cure a woman of this propensity so quickly as to put her in a position where she is obliged to hear whether she wants to or not. The things that strike the ear pleasantly enough at first soon grow wearisome, and in a few days the dreary monotony begins. Why the word "hello" is the invariable telephone salutation, remains a great mystery. "You wouldn't exclaim 'Hey, there!' or 'Say, you!' would you?" asked the superintendent of the telephone company. "I'd like to know what else you'd say but 'hello.'"

A New "Ticker.'

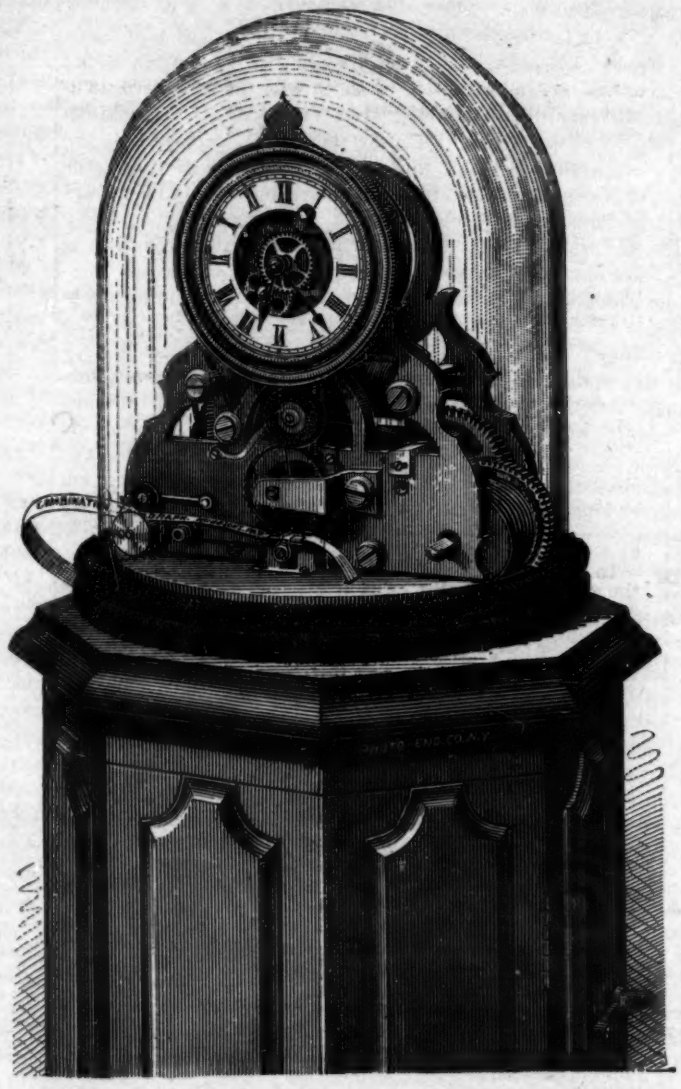
We give herewith an illustration of a new stock printing telegraph instrument, the invention of Mr. Adolphus A. Knudson, of the Knudson Electrical Company of this city. The instrument, which possesses several novel features, is about to be introduced in this city by a company, articles for the incorporation of which were filed at Albany on Dec. 29, under the name of the Exchange Telegraph Company, the incorporators being Messrs. Frederick S. Huntington, John F. Alexander, A. A. Knudson and others, whose names have not yet been made public. The purpose of the company is to furnish quotations from the floor of the Stock Exchange, a service that has been performed exclusively by the Gold & Stock Telegraph Company. Permission to enjoy the same privileges allowed to that company was granted at a recent meeting of the Governing Committee of the Stock Exchange. The capital of the new company is to be $500,000, in shares of $50 each, but it may be increased to $5,000,000. A sufficient number of instruments has not been manufactured to enable the company to begin business at once, but it is expected that the delay will not extend beyond a few weeks. The company will collect quotations on the floor of the Exchange in the same way that the Gold & Stock Company now collects them.

In addition to furnishing stock quotations, the instrument is provided with a clock which may be regulated automatically any desired number of times a day, from the central station, and a messenger call is provided by a mechanism hidden in the pedestral and controlled by a crank on the outside. Besides being a messenger call, it can be used to notify the central office in case the instrument becomes seriously deranged, and call an inspector to adjust it, thereby avoiding the expense of time involved by sending a clerk to report the instrument, and providing for its quick restoration to working order.

The principal features of the printing instrument are the rapidity of its action, which is from 120 to 130 revolutions per minute, and the method of bringing the instruments into unison, which is effected automatically by each instrument and independently of the central station. The liability of the instruments to get out of unison is the most difficult thing to overcome in a system of this kind, and it is prevented in the Knudson "ticker" by the following device: The clockwork shown in the illustration, which serves as a time-piece, and is regulated at intervals by an impulse sent over the wire from the central office, has attached to it, by friction, on the shaft that carries the hands, an arm which moves with the hands and constantly tends to "cut out" the magnet which controls the printing mechanism, and to throw into circuit another magnet, whose function is to bring the type wheel to the "unison" point.

When the type wheel is in motion a cam on its shaft keeps pushing back this arm at every revolution, thereby preventing it from accomplishing its purpose; and if the type-wheel comes to rest at the "unison" point (as it should normally) the cam is just opposite the arm and holds it back; but if the wheel comes to rest at any other point, the cam no longer being opposite the arm, the latter completes its movement, and throws the "unison" magnet into the circuit; this brings the type-wheel to unison, and in so doing the cam again pushes the arm back, the unison magnet is cut out, and the instrument is ready for work. Thus, every time the transmitter at the central offices pauses, if any of the "tickers" on the line are out of unison, they bring themselves into unison automatically.

We understand that one of the opposition telegraph companies has obtained an interest in the instrument, and will work it in connection with its lines.



KNUDSON'S STOCK PRINTING TELEGRAPH.

Electrical Engineering at the Massachusetts Institute of Technology.

We mentioned in our last issue that this school had established a four years' course in electrical engineering. We learn that six students are now taking the course, five of them regular students of the institute and one a special student, though special students are not desired in the experimental stage. Instruction will be given in land and submarine telegraphy, the telephone, electric lighting and the electrical transmission of power, while among the novelties of the course will be the study of special methods in photometry, and also of acoustics as an aid to the intelligent practice of telephony. Tests in short distance lighting will be afforded the students over the institute's own wires, and Professor Cross has no doubt that arrangements can be effected with the electric light companies for occasional experiments at longer distances. Sooner or later the institute will put in its building dynamo machines of all the important types, thus affording ample opportunities for comparative measurements. The aim of the institute is not to give training in handicrafts, but a general education in the application of science to industry is given to all the students, and a special education in the application of science to special industries to individual students.

Recent Improvements in Morse Telegraph Keys.

The rivalry among inventors and manufacturers has led to many recent improvements in telegraph keys, much to the advantage of the operators.

Steel levers, in place of brass, have found favor on account of combining strength with lightness and a certain amount of elasticity. This feature distinguishes the Bunnell and the "Acme" keys, which have received very favorable indorsements from operators.

Judging from the number of keys with rotary or detachable contact surfaces, whereby they can be readily cleaned or fresh points of contact can be presented, such an arrangement is desirable and has been found advantageous. In the Cumming key the contact is made on the periphery of two small discs or wheels placed at right angles to each other; new surfaces can be presented by turning either or both discs, and dust does not readily lodge on them; but the chief advantage claimed is that the contact surfaces being confined to mere points, a more effective "make and break" contact is insured than where the surfaces are flat ends of wire.

In another recent key a multiplying or auxiliary lever has been introduced. With very little play of the lever proper, a much larger break between the contacts is obtained, which greatly lessens the liability to "stick."

The adjustment of the trunnions of keys has been a prolific source of annoyance to operators, though much of this has been obviated of late years by the bestowal of more care in the manufacture. Some makers have sought to exclude it entirely, by the substitution of a free acting joint placed at the back end of the lever. The original key of this type, the "Victor," is very compact in form, occupying little more than half the space taken up by an ordinary key, and has other novel features. The regulation of the play of the lever is effected by a turn of the key-knob, and the spring is placed close to the back end of the lever.

Of the two latest keys, the Stevens has its contacts at the back end and above the lever, and is styled the "anti-paralytic," it being held that this arrangement of the contact points removes the jarring from under the fingers and makes the key easier to work, thereby lessening the liability to telegraphers' paralysis.

The other, the Prosch key, has its contacts just the reverse of those last mentioned, namely, at the forward end of the lever, directly under the key-knob. To prevent jarring the lower point is fixed to a spring arm. The inventor has sought to combine in this key, as far as possible, the features that have hitherto been found advantageous, such as lightness and elasticity of lever, absence of trunnions, rotary contact surfaces with contact confined to minute areas, large break between contacts and compactness of form.

Altogether, the operator of the present day has a large field to choose from in the matter of keys, and there ought to be no excuse for "bad Morse."

A GROWING INDUSTRY.—The New England Glass Company, of East Cambridge, Mass., is doing a large business in the manufacture of globes for electric lamps.

The Telephone Litigation in England.

An esteemed London correspondent writes as follows:

"In THE OPERATOR for Nov. 18, 1882, appeared an account of a protracted trial which took place in England before Mr. Justice Fry, in which the United Telephone Company, as owners of the Edison and Bell patents, brought action against Messrs. Harrison, Cox-Walker & Co., of Darlington, for infringement of the same, the learned Judge holding that the Edison transmitter patent was void, and that the Bell patent was not rendered invalid by the publication by Sir William Thomson of what is now well known as the Glasgow receiver.

"The United Telephone Company appealed against the decision of the judge with respect to the Edison patent, while at the same time it immediately took steps to have that part of the patent which invalidated the whole disclaimed before the Attorney General.

"The defendants appealed on that part of the case relating to the Bell patent. The action of the plaintiffs was somewhat an anomalous one, for while asserting that the judgment of the Court, in the opinion of eminent legal counsel, was not likely to be sustained, simultaneously with that statement it sought to disclaim the obnoxious part of the patent. Wednesday, the 22d of December, was the day fixed for confirming in a legal form the company's intention to prosecute the appeal of which it had given notice, but it withdrew its notice, thereby confessing to the judgment as to the invalidity of the patent.

"The appeal by Messrs. Harrison, Cox-Walker & Co. will come on for hearing at an early date, and it is understood that in connection with the action a very important, if not vital issue, for the plaintiffs will have to be decided, as to the legality of the disclaimer granted by the Attorney General on the Edison patent, after a judgment had been given holding the latter's patent in question void.

"The Edison patent, which originally consisted of 30, had by two disclaimers before the Attorney General, been reduced to three claims, and the 28th and 29th claims, which proved so disastrous to the plaintiff's case, having been eliminated, there is but one claim remaining, and it is believed that even this will not be sufficient to maintain the validity of a patent which the plaintiffs have spent so much money to uphold.

"The action against Messrs. Harrison, Cox-Walker & Co. was really defended by the London & Globe Telephone Company, which took upon itself the severe fight and bore the heavy expenditures incidental to such an important trial, and which could not possibly be sustained by men of such moderate means as the defendants, who were mere preternoms in the action, and who, but for the aid and stepping in of the Globe Telephone Company, would have been compelled to succumb to the inevitable end which the lack of money and the necessary means to properly defend the suit must have brought.

"Already the opposition fight between the London & Globe and United Companies has commenced. The former has just received its license from the Postmaster General to transact a telephone business in London and its radius, and is now actively prosecuting its labors in the construction of lines and the laying of cables, which will all be put under ground, and feels confident of assured success inasmuch as the United, on account of its poor service, is very unpopular."

Technically speaking, it "breaks an operator all up" to have a traffic chief accost him in the coat room and inquire whether he shall bring the business down there for him to send.

On the Mexican Central Railway.

To the Editor of The Operator and Electrical World:

SIR: This road starts from Paso del Norte, Mexico, on the opposite side of the Rio Grande from El Paso, Texas, and runs due south 224 miles, to Chihuahua, Mexico, to which point regular trains are running. From Chihuahua the road takes a southeasterly course and is being rapidly extended towards the City of Mexico. The general office of the company is at Paso del Norte, where Mr. Chas. F. West, superintendent of telegraph and chief train dispatcher, is located, assisted by dispatchers Andrew Smith in the day-time and J. D. Mathews, nights. At Samalayuca Mr. H. Rogers is agent and operator. Mr. W. T. Miles is agent and operator at San Jose, with Mr. J. M. Smith as night man. Continuing southward, we find Mr. D. B. Saffold as agent and operator at Ojo Caliente and Mr. Leman B. Silvernail agent and operator at Montezuma. Mr. H. E. Harkrider is agent and operator at Gallego, assisted by Mr. E. B. Guilfoyle nights. Mr. C. D. Jones is operator at Laguna. At Sauz, the residence of the Governor of the State of Chihuahua, is Mr. W. H. Allen, of Chicago, as agent and operator. Mr. G. E. Seburn is agent and operator at Sacramento. At Chihuahua Depot we find Messrs. R. A. Bagnell and J. C. Miller, day and night operators respectively. At the chief engineer's office Mr. T. J. Woodside is chief clerk and operator, while at Chihuahua City office Mr. J. L. Rogers is manager. At the end of track, 20 miles southeast of Chihuahua, is George E. de la Ronde as pioneer operator.

Track-laying is progressing at the rate of a mile and a half a day, and the line-builders keep pace with the track-layers. We expect to reach Santa Rosalia, sixty-five miles southeast, by Feb. 15 next.

I will defer an account of the country and its inhabitants until my next letter. DE,

END OF TRACK, 20 miles from Chihuahua, Mexico Dec., 98,

An Embryo Rival of Jay Gould.

To the Editor of The Operator and Electrical World:

SIR: There is employed in one of the Western Union up-town offices an operator, whose name I withhold from publication for obvious reasons for the present, possessed of talents of such a high order that should the opportunity he has long sought to engage in other business present itself, I feel tolerably certain that the profession he adopts will be greatly benefited thereby, and the modern science of telegraphy receive a blow from which it will not soon recover.

Commencing at the lowest rung of the ladder he has, by the practice of numerous ingenious, though not less questionable methods, steadily, if not rapidly, risen to the highest, until now we find him at the head of a flourishing but unincorporated telegraph and telephone business. He first established a line from the office of which he is the responsible head to the residence of his messenger, who gloats over his ability to send a message, using Western Union poles and insulators when his cool impertinence failed to wring from property owners on the selected route permission to place the necessary fixtures upon their housetops, and then, with a view of enhancing the value of the "plant," he extended the line to the residences of other boys, employed daily in adjacent factories, and nightly in acquiring the telegraphic art, they, in consideration of the sum of $2.50 and a solemn pledge not to "corner" or "water" the stock, becoming stockholders in the enterprise. The "responsible head" next built, and now operates, a line of telegraph, with telephone connections, in a small suburb of New York City, where, it is said, whole families have become en rapport with dots and dashes.

The telephone companies would do well to see that their patents are not infringed and their rights violated, and it is to be hoped that the Western Union officials will not only "corner" the stock, but add enough "water" to the anatomy of the "managing director" to effectually dampen his ardor. ELLIOTT.

NEW YORK, Dec. 28, 1882.

The Telegraphic Labor Problem.

To the Editor of the Operator and Electrical World:

SIR: There is so much talk against telegraph colleges, by the telegraphers of the country, as well as futile attempts to squelch them for the purpose of shutting off the supply of "plugs" constantly swelling the ranks of the profession, that it prompts me to give my late co-laborers (for I am not now engaged in the business) my opinion as to the benefit to be derived from this kind of warfare, as compared with the benefits to be derived from another plan which I shall suggest further on.

They may, like Don Quixote, fight the windmill ("plug" mill) as long and ferociously as they desire, but they only fight it, gaining no victory, the mill going steadily on, doing its daily work and turning out its regular grist. The grist so turned out does the fraternity very little harm compared with the harm done by the operators themselves, and the check boys, girls and messengers in all offices. Check boys and messengers are a necessity, they will learn telegraphy in spite of anything the telegraphers can do; they cannot be stopped. The ranks are constantly being increased by this class at the rate of over one thousand a year, perhaps five thousand. This should be the objective point, and all attacks should be centered right here. Let the colleges alone; don't waste any time on them.

In order to prevent the number of telegraphers being increased, *close the doors, shut yourselves in, shut the plugs out.* But how? The organization of the Brotherhood is strong. Let it insist on one point, viz.: Refuse to work in any office where non-members of the Brotherhood are employed. Give 30 days time for all operators now employed to join the Brotherhood. Those *not* joining must go. Those learning the business hereafter must first be admitted to the Brotherhood. All operators discharged for dishonesty, total depravity, etc., to be tried, and if found guilty, to be dismissed from the society, and, consequently, from further opportunity to disgrace the profession. Then again, if there should be a greater demand for operators than the Brotherhood could supply, they can admit some of the "plugs," being careful to select the best stock in the market. This would eventually elevate the profession to that social plane where it rightfully belongs. By this plan (crudely mentioned), or some similar one, the telegraph companies would be benefited as well as the profession. VIEJO.

CINCINNATI, O., Dec. 25, 1882.

Telegraphy in Baltimore.

To the Editor of The Operator and Electrical World:

SIR: Since my last communication the handsome office of the Baltimore & Ohio Telegraph Company has been finished and occupied, and is working satisfactorily. In the operating department there are eighteen quartet tables, fifteen of which are used for single sets of instruments. Two sets of Miller's Duplex are working, one to New York and one to Chicago. There are also six sets of Bunnell repeaters. There is room for six more tables, which will be put up when they are needed. One of the most attractive features is the mammoth switch-board, manufactured at the company's shops in this city, under the direction of Mr. Hackett. Superintendent Stewart's rooms are at the side of the operating department, and are furnished handsomely. The day force is composed of Messrs. C. P. Adams, chief operator; W. S Logue, assistant chief; operators, Messrs. Farley, Parker, French, Baron, Dickinson, Steltz, Brown, Clagget, Beck, Cameron, Staylor, Glenn and Bunting. On the night force, chief, E. J. Little; assistant, W. F. A. Hasson; operators, Messrs. Bradley, L. A. Burck, Connolly, DeBerry, Plummer, Calder and Bowersock, Jr. Mr. C. W. Clarroe is assistant to Superintendent Stewart; Mr. Hart, cashier. At the old main office Messrs. G. W. Lombard, Ward, Bennett, Boggs and Buckman handle a large business. Mr. Garrett is to be congratulated upon having secured such an array of talent.

Mr. F. T. Jenkins, a well-known operator of the Union Railroad, was married on Nov. 29, to Miss Duff, of this city. Mr. Jenkins deserves, and we wish him, a happy and prosperous journey through life.

Mr. Malcom Hart, cashier of the Baltimore & Ohio Telegraph Company, was the recipient of a cake basket and napkin rings from the operators in the office on Dec. 29. Mr. C. P. Adams made the presentation address.

Mr. H. C. Keys, superintendent of telegraph of the Philadelphia, Wilmington & Baltimore Railroad, has requested the resignation of Mr. W. Lenz, operator at Edgewood, Md., for refusing to teach a student during office hours.

Mr. W. B. Nelson has resigned his position in the Western Union office here, and accepted a similar one with the Baltimore & Ohio Company. Among the late departures from the Western Union are Messrs. Cameron, Connolly and McKeever.

Thirteen employés of the Bankers' and Merchants' Telegraph Company were arrested for entering property and cutting away trees belonging to farmers in Harford County, this State. An injunction was also obtained restraining the American Rapid Telegraph Company from entering upon and damaging property. EXCELSIOR.

BALTIMORE, MD., Dec. 30, 1882.

Suggestions for the New Year.

To the Editor of The Operator and Electrical World:

SIR: New Year being the time when good resolutions are in order, when we are supposed to turn over a new leaf and start a new record, unsullied by aught of injustice or malice toward our fellow men, and as we cannot "see ourselves as other see us," I wish to speak of a few evils that should be corrected by my brother operators, and also some who outrank them in the service. To that class who seek their own advancement by crushing down their co-laborers, I would say: Consult your own interests by discarding that most abominable demeanor of conscious superiority (which only exists in your own over-fertile imaginations), and treat those with whom you are associated with the consideration and courtesy due to intelligent men and women, thereby making them your friends, not your enemies, and instead of losing prestige you will advance just as rapidly, not standing on unsafe ground, but backed on every hand by friends willing and anxious to pay a tribute to worth by assisting you to overcome obstacles that to you unaided would be insurmountable. It puzzles me to divine by what line of reasoning officers are induced to select for promotion men shunned by all with whom they are associated. Nevertheless, this is true to such an extent that a majority of those who are promoted before they acquire this pernicious quality, proceed to make their positions secure by adopting it at once. It seems to me that he to whom the men look up as a model (and whose slightest request they would obey with more alacrity than they would the most imperative commands of a self-important sub-chief), would be the man who would best serve the interests of his employers. I don't see why treachery to his co-laborers should be considered such a high recommendation for promotion; for he who sells his manhood in one instance would not hesitate to repeat it upon inducement. Of course there are exceptions, but they are exceptions truly, not the rule. Those who promulgated the rule under which managers are powerless to reward faithful service by advancing salaries (there are numbers of cases, where managers have said "I cannot raise your salary, you are worth more, and if you will resign and stay away a month or two I will put you to work at higher wages"), those who require the enforcement of such rankly unjust rules, should remember there is an ever watchful Eye taking cognizance of these acts of oppression and they will receive credit for them and be called to account in a Court from which there is no appeal.

To operators I would say: Shun evil companions, discard the gaming table, the haunts of vice, and resolve to endeavor to let the next New Year find you a step higher socially, intellectually, and morally, and remember that *He* helps those who help themselves. A happy New Year to all. VERITAS.

CHICAGO, Dec. 26, 1882.

The Phillips System of Telegraphic Punctuation.

To the Editor of The Operator and Electrical World:

SIR: In a recent issue of your paper you spoke editorially of a system of punctuation which had been developed on the Associated Press wire, and gave several illustrations of what was now in use on that circuit. You were in error, however, in not stating that all the punctuation marks cited were part and parcel of my system of steno-telegraphy. Since the publication of your article I have not been into a Western Union or Mutual Union Office without hearing "Qn," "Pn," "Si," etc., going over the wires. The "boys" seem to have taken such a fancy to the punctuation marks, as far as you gave them, that with your approval I will now give a leaf out of the preface to my book, which explains the whole scheme for transmitting "press" in first-class shape.

The punctuation marks as amended and used as a part of the Phillips system are as follows:

Comma, - — - —
Interrogation point, — - - — -
Exclamation point, — — — -
Colon, Ko.
Colon dash, Kx.
Parenthesis, Pn.
Quotation marks, Qn.
Quotation marks within a quotation, Qx.
Brackets, Br.
Dash, Dx.
Semi-colon, Si.
Period, - - — — - -
Paragraph mark, — — — —
Underline, Ux.

When figures are sent representing dollars *without* cents, the group of figures should be followed with the letter d, thus $9—9d; $8,987,694—8,987,694d.

When cents are intended, or when the figures express both dollars *and* cents, the letter c instead of d should be used, thus: 25 cents—25 c; $8,987.62—8,987.62 c.

Owing to the fact that three ciphers when quickly transmitted bear a striking resemblance to a figure 5, it has been found better to use "tnd" for thousand and "myn" for million when thousands or millions are expressed after the first, second or third figures by ciphers exclusively, thus: 10,000—10 tnd; 248,000,000—248 myns.

"Hnd" may also be used to advantage sometimes to express hundreds, thus: 400—4 hnd; 500,000—5 hnd tnd; 300,000,000—3 hnd myns.

Decimals should be sent by inserting the word "dot" thus: 0.34—0 dot 34; 89.92—89 dot 92.

When an omission occurs in the copy, and the fact is shown by the presence of asterisks, the letter x several times repeated will indicate that asterisks are to be inserted in the copy to be sent out, thus: And this has been one of the results. * * * * * Who shall account for such corruption—And this has been one of the results, x x x x x Who shall, etc.

In sending poetry, or one or more lines of verse, a paragraph mark (— — — —) should be used at the end of each line, thus:

The gentleman on the other side, as it seems to me, takes a superficial view of what has been developed, and manifests a disposition either to defend these obvious irregularities or content himself with what appears on the surface. Unless he corrects his methods, I fancy the poet's words:

- - - - - - The primrose on the river's brim — — — —
A yellow primrose was to him — — — —
And nothing more - - - - - - - — — — —

will be peculiarly applicable to my credulous colleague in the near feature, and he will discover that he has missed an opportunity to render a great service to the cause of common honesty. WALTER P. PHILLIPS.

WASHINGTON, D. C., Dec. 30, 1882.

THE ELECTRIC LIGHT.

A NEW COMPANY.—The New York & Brooklyn Electric Light Company, of New York, capital $25,000, was incorporated at Albany on Dec. 30.

EXTENSION OF THE BRUSH PLANT.—In addition to the extensive works already in operation in Cleveland, the Brush Electric Company is erecting a large building to be supplied with steam power to the extent of 1,000 horse-power, for the purpose of manufacturing the new storage battery, etc.

THE COMING LIGHT.—The London *Lancet* has come to the conclusion that the electric light must soon become the common illuminating agent, although for comfort, it thinks, the light will not compare with that given by the old-fashioned pure wax candle. It thinks some method is needed to mitigate its intensity.

LIGHTING STATE RAILROAD SHOPS.—On Nov. 30, the workshops at Luttre of the Belgian State railways were partially lighted with electric lamps of the arc sort, having the current supplied by Gramme machines. Now these buildings are to be fully illuminated by electricity, the experiment having proved highly successful.

ELECTRIC ILLUMINATION WANTED.—Business men of Pittsburgh have petitioned the councils of that city, to have Fifth avenue, from Grant to Liberty street, the business centre, lighted by electric lamps instead of gas. It is estimated that 16 arc lamps will be sufficient. They will cost $9.60 per night, a little more than gas, but the petitioners think the light will be worth the difference.

LIFE OF EDISON LAMPS.—The Edison Company, of England, guarantees its lamps for 900 hours. The *Mechanical World* thinks this is not accepting any very great risk, for it learns that in the case of a factory lighted by this system nine only have failed, while the remaining 121 have "glowed" for over 2,400 hours. Supposing the lamps to be in use for the whole of the working day—say 3,000 hours per annum—the cost for renewals on this score is less than 5s. per lamp.

SHORT-CIRCUITED BY A RAT.—Messrs. Willoughby, Hill & Co., of Chicago, have a large number of Brush lights in their store, which are fed by a 40-light Brush machine. On Dec. 23 the lights suddenly went out, while the store was crowded with people. Underneath the dynamo was found a rat, dead and rooted to the spot, with one leg raised as if to take a step and the others on the conductors attached to the brushes, the current passing through his body. When the rat was removed the lights resumed their brilliancy.

INFLUENCE OF THE ELECTRIC LIGHT ON HEALTH.—This subject was lately discussed at a meeting of the Hygienic Society of Hamburg, and Dr. Kruss explained his views on the subject at some length. He referred to the influence of the electric light on the human eyesight, and expressed his opinion that it produces no evil effects, the light having a violet tinge under most circumstances. He referred to the somewhat exaggerated expectations which had been formed as to the distance at which the light was visible at sea; but, on the whole, he considered that the safety of human life at sea had been increased by the use of the electric light in lighthouses. The electric light being free from the disadvantages incidental to the combustion of gas in the consumption of oxygen and the production of carbonic acid, he considered its development as being a hygienic measure of importance.

CONTINUOUS LIGHTING FOR SIXTY-FOUR HOURS.—During a recent extraordinary fog in London, the Edison Electric Light Company, recognizing the necessity for distributing the light to its customers without intermission, maintained its dynamos in action at Holborn Viaduct for a continuous period of sixty-four hours without stopping. Starting at three o'clock on Saturday afternoon, December 9, the dynamos ran without ceasing during Saturday, Sunday, Monday, and Monday night, stopping at eight o'clock on Tuesday morning, December 12. The current was supplied from two large dynamos, which are used alternately, and during this long run the current was switched off from one dynamo on to the other, or back again, five times by means of a specially designed switch, which enables this to be done without in the least degree interrupting the lighting.

TELEPHONE DEPARTMENT.

DEATH OF A MANAGER.—Sylvester L. Samuel, manager of the Law Telegraph Company's Produce Exchange office, New York city, died suddenly of heart disease last week.

APPOINTMENT.—Major R. B. Hoover, well-known to all our readers as the gentleman who proposed the testimonial to Prof. Morse some years ago, has been appointed assistant superintendent of the telephone company at Springfield, Ill. Major Hoover was formerly Western Union manager at Allegheny City, Pa., and has had a large experience in both railroad and commercial telegraphy.

THE TELEPHONE ON THE RIVER PLATE.—It is announced that on the completion of the consolidation of the Rio de la Plata Telephone Company, Limited, and the National Pan Telephone Company of Buenos Ayres, the new company will have the most extensive system of central offices, house-top and pole lines in South America. A circular issued by the joint companies on Dec. 15 states the number of subscribers to be 700. The new company will own 1,200 Bell telephones of the latest pattern, and has ordered 500 more. The new company will own all rights of the Bell telephone for the Argentine Republic and Uruguay.

DIVIDENDS IN NEW ENGLAND.—There were well attended meetings in Boston, on Dec. 30 of the five telephone companies which are principally under the management of Lowell parties. The president, W. A. Ingham, presided at all, and the reports were read by Clerk and Treasurer, Charles J. Glidden. Quarterly dividends were declared, all payable January 10th, as follows: National Bell of Maine 4 per cent.; Boston and Northern 3 per cent.; Suburban 2 per cent.; Bay State 2 per cent.; Union (N. Y.) 1½ per cent. All stock upon record at the close of business, Monday, Jan. 1, will earn dividends. The reports from all quarters, respecting the telephone interest, were specially encouraging to stockholders.

PROVIDENCE, R. I.—The Providence Telephone Company has issued its fifth directory, dated Jan. 1, 1883, which shows nearly 1,600 telephones in use in that city, and a large number in Woonsocket, Franklin, Pawtucket, Bristol, East Greenwich, North Attleboro', Attleboro', Warren, Pascoag and Westerly. In the Providence exchange each operator has charge of a switch-board in which are grouped thirty-five wires connecting with from fifty to a hundred subscribers. When the subscriber called for is on another switch-board the operator tells the calling subscriber to wait a minute, and connects him to a wire leading to the desired switch-board. He then electrically signals the second operator that such connection has been made. The second operator asks the calling subscriber what is wanted, the subscriber repeats his order, and the party wanted is immediately summoned.

DASHES HERE AND THERE.

THE PATENT OFFICE.—The receipts of the Patent Office for 1882 were $1,000,186, and its net revenue $325,000.

A NEW WIRE COMPANY.—The Triplex Insulated Wire and Rubber Company, of New York, was incorporated at Albany on Dec. 29, with a capital of $500,000.

THE FINNEY ELECTRIC COMPANY.—This company, whose formation we recently mentioned, is fitting up a building in Allegheny, Pa., formerly used as a cotton mill, and expects to begin work about Feb. 1.

THE FRENCH NAME FOR IT.—A French contemporary commends the liberality of the "Western Telegraphic Union" in transmitting time signals free throughout the United States for observers of transit of Venus.

A LONG SOUTH AMERICAN CIRCUIT.—A dispatch from Valparaiso, dated Dec. 27, announces that a scientific commission is about to establish an observatory in order to fix the longitude of Valparaiso by means of a telegraph between Buenos Ayres and Callao.

MUTUAL UNION TELEGRAPH.—A majority of the stock of this company was deposited with the Central Trust Company, of New York, on Wednesday, in accordance with the original plan, which Mr. Gould had tried, by legal measures, to prevent being carried out.

LOOKING AHEAD.—M. W. de Fonvielle, editor of *L'Electricité* and author of many popular treatises on electrical and other scientific subjects, has issued the first number of a new astronomical journal, *Le Passage de Vénus*. He announces that the second number will appear June 8, 2004.

A LUCKY TELEGRAPHIST.—W. C. Anderson, the young telegraph operator of Lachute, Canada, who was mentioned in our last issue as having fallen heir to three-quarters of a million dollars by the death of an uncle in Scotland, has been notified of a bequest to him of $100,000 made by another uncle deceased.

WESTERN UNION SUED FOR TAXES.—Attorney General Russell, of New York, has filed a summons and complaint against the Western Union Telegraph Company for neglect to pay State taxes on its dividends for 1881. The complaint alleges that up to November, 1881, the tax amounted to $121,000, of which only $1,281.34 has been paid. Suit is now brought to recover this sum, with interest, and a penalty of $12,000.

THE T. M. B. A.—A correspondent asks how the amendment to increase the amount of the reserve fund was carried by a vote of 1,100 in its favor, which is less than a majority of the members. If he will examine the by-laws of the association, our correspondent will see that the constitution and by-laws may be altered or amended by a two-thirds vote of the members present or properly represented at any annual meeting of the association.

MORE WESTERN UNION ABSORPTION.—A Detroit dispatch says it is understood that about 1,400 miles of telegraph lines, chiefly in western and northern Michigan, passed into the possession of the Western Union Company on Jan. 1, under a contract by which that company has thereafter the lease of the lines with the option of purchase. They were built and owned by the Michigan Telegraph Company.

T. M. B. A. ASSESSMENT.—The Telegraphers' Mutual Benefit Association has issued assessment No. 160, dated Jan. 1, to meet the claim arising from the death of Richard M. J. Paynter, of Richmond, Va., who died Nov. 23, 1882, of acute pneumonia. One dollar is due on this assessment from members holding certificates up to and including No. 4,320. The claim arising from the death of George F. Barnes, who was murdered at Baring Cross, Ark., on Oct. 30, 1882, will be paid from the surplus.

THE VOLTA PRIZE.—The Volta prize of fifty thousand francs, instituted by a decree of June 11, 1882, will be awarded in 1887 to the author of a discovery which will render electricity effective and economical in one of the following applications: As a source of heat, of light, of chemical action, mechanical power, and as a means of transmitting dispatches, or treating invalids. Physicists of all nations are admitted to the competition, which will remain open until June 30, 1887. A commission, nominated by the Minister of Public Instruction, will be charged to examine the specified discovery. The report of the commission will be published in the *Journal Officiel* of the Government.

ANOTHER "UNREPEATED" MESSAGE.—At Louisville, Ky., on Jan. 2, a decision was given by Judge Jimrall against the Western Union Telegraph Company. The action was based on a mistake in the transmission of a telegram sent in cipher, by the substitution of "St. Louis" for "St. Joseph." Owing to the mistake and consequent delay the plaintiffs, a commission firm in Louisville, lost their commission on a transaction amounting to $11,000. The company claimed that the message was an unrepeated one, and hence, according to the contract printed at the top of the blank, it was liable only for the cost of the message. The opinion is a very long one.

NEW YORK CITY ITEMS.

Echoes from 195.

'82 to '83—"73."

Mr. R. J. Tomes has left 195 to engage in more lucrative employment.

Mr. F. Bunce, a favorite with the ladies, is now working days on the Albany quad.

A wrestling match, Graeco-Roman style, between Messrs. Jackson and Maver is spoken of.

Mr. Frank Hennig has resumed work in 195, after a successful tour with the Kate Rogers Dramatic Company. He is said to be a promising actor.

The brothers Van Nortwick and Mr. F. Bunce are to be among the chief participants in a minstrel entertainment to be given shortly in Paterson, N. J.

Who was it that stated, upon being informed that he was considered incompetent for a certain department of 195, that "they could take the whole department, men and all, boil it down into one, and he was better than them all?"

The chess tourney is now in full sway and considerable interest is shown as to the result. Mr. F. W. Baldwin, vice president of the club, will probably be a winner should Mr. Mitchell defeat Mr. Morris in the games yet to be played.

The operator who has been most frequently late during the month is, according to custom, awarded, as a prize, the split trick. Mr. Chas. Hilliard last month polled the highest vote on record, as a candidate for the position, not having missed a day. He was elected.

Among his intimates, the fondness of the young chief of the race wires for pies is proverbial; when, therefore, the other morning, a lady friend in a down town office sent him a delicious home-made mince pie, he was delighted, and immediately sent out notes to several of his confrères, apprizing them of the arrival of the pie and inviting them to come up-stairs at lunch time and—see him eat it. He had taken the precaution to hide the pie in a secure place, but he left one clue unguarded, and a committee, organized for the purpose, speedily obtained possession of the coveted pastry and bore it to the battery-room, where it was soon a thing of the past. One little crust was sent to Mr. B., with the information that his confrères would be up-stairs at lunch time—to see him eat it.

Mutual Union—135 Broadway.

Mr. W. J. Curtis has resigned.

Mr. Richard Powers is confined with an affection of the heart.

Mr. C. P. Flood is rapidly regaining his usual health.

Mr. Edward Blakeney takes the place of Chief McCarthy during his temporary absence.

Mr. and Mrs. A. H. Seymour received many callers at their residence in Brooklyn, on New Year's day, among whom were many telegraphic friends.

The marriage of Mr. P. J. Tynon to Miss K. A. Haughey took place on Thursday evening, Dec. 20, at St. Francis Xavier Church, this city, Rev. Father Bradley officiating. The best man was Mr. John Neilon, and the bridesmaid, Miss Lu. Haughey. A reception was afterward given to friends at Mr. Tynon's home in Brooklyn. The telegraphists present were Mr. Wallace Grant, Mr. J. T. Neilon, Mr. M. Higgins, Mr. Wm. Leahy, Mr. R. W. McNamara, Mr. John O'Brien, Mr. E. Blakeney, Mr. John Cochrane, and others. Congratulations were received from New York, Buffalo and Chicago.

Other City Items.

The regular meeting of the N. Y. Electrical Society was held on Friday, Jan. 5. Prof. Vanderweyde delivered an address on "The Electrical Theory of Steam Boiler Explosions."

The annual meeting of the Gold & Stock Life Insurance Association, an organization of employés of the Gold & Stock Telegraph Company, of New York City, will be held in Room 48, Western Union Building, at 5:30 P. M., on Monday, Jan. 8.

William Jones, a lineman of the American District Telegraph Company, attempted, on Jan. 3, to swing himself from a sixth-story window to the roof of an adjoining building, at 409 Broadway, by means of an iron bar set in the masonry. The bar gave way and the unfortunate man fell to the earth, seventy-five feet or more. He died at once.

PERSONAL.

JAMAICA.—Mr. H. C. Wilson, the popular superintendent of the Post Office Telegraphs in Jamaica, was presented by the staff, on Dec. 19, with a fine gold watch, appropriately engraved and inscribed.

BOSTON, MASS.—Mr. James H. Ryan, of the Western Union office in Boston assisted in capturing two burglars on Dec. 26, who had broken into a private office in the Western Union Building.

MEXICO.—Mr. George W. La Rue, formerly a superintendent of the Mutual Union Telegraph Company, sailed for Mexico on Jan. 4, to look after the mining interests of Messrs. Delano & Haines, of New York, in that republic.

CHAMBERSBURG, PA.—Mr. B. Frank Gilmore, a telegraph operator, of Chambersburg, has in his possession the official key to the Government cipher used in transmitting telegrams between the Union commanders at the time of the Rebel invasion of Pennsylvania.

PROVIDENCE, R. I.—Mr. W. A. Austin, formerly of the Western Union office at Albany, now foreman of the Bay State mill packing room, of the American Screw Company, at Providence, received as a Christmas present from the employés of the packing and shipping room a handsome reclining easy chair.

CINCINNATI.—We have received resolutions of condolence passed by the "Gang of Good-fellowship, No. 2,123, I. O. O. B." (Independent Order of Old Bachelors), at Cincinnati, upon the marriage of their well-beloved brothers, John M. and Daniel S. Duey, of the Western Union office, which we regret that we have not enough space to give in full.

OSCEOLA, IOWA.—Mr. A. E. Towslee, formerly of the C. B. & Q. R.R., is now superintendent of telegraph of the Des Moines, Osceola & Southern Railroad Company. During the past summer Mr. Towslee superintended the construction of a 60-mile line for the latter company, from Des Moines to Osceola, which has worked since July without a break. He is now extending the line 25 miles farther, to Decatur City, Iowa.

DENVER, COL.—The state of feeling in the Western Union office at Denver seems to have undergone some change since the little unpleasantness of last summer. We learn that about 8 o'clock on Saturday evening, Dec. 23, a dozen or more of the clerks and operators, representing also those who were on duty, drove out to the residence of Assistant Superintendent B. R. Bates, and presented Mr. and Mrs. Bates with a silver tea service of beautiful design. Mr. Crittenden made a neat presentation speech, to which Mr. Bates responded in a few words of thanks and good wishes.

MATTOON, ILL.—Mattoon is well supplied with telegraphic talent. Mr. W. M. Chettle is manager of the Western Union office, with Mr. R. J. Hammond as assistant and Mr. Frank Tremble Board of Trade operator. At the Indianapolis & St. Louis Railroad office, Mr. A. M. Mozier is train master; Mr. Charles Reynolds, chief dispatcher; Messrs. Frank Roberts, T. J. Bigelow, R. N. Michner, Ira Belknap and Richard Doyle, dispatchers; and Messrs. French, Sullivan, Stokes, Stubblefield and Comingore, copying and way-wire operators. At the shops Mr. H. M. Sheehan is operator. Mr. O. W. Bell is chief dispatcher of the Peoria, Decatur & Evansville Railroad, with Messrs. Keran, Battles and Butler as assistant dispatchers. Mr. John Phelan is operator at the Illinois Central Railroad office, and Mr. J. G. Coates at the Indianapolis & St. Louis Railroad Company's freight office.

MARRIED.

DE BLANC—DE MAHY.—At St. Vincent de Paul church, New Orleans, Dec. 26, 1882, by the Rev. Father Choppis, Mr. Daniel De Blanc, operator M. L. & T. R. R., at St. Martinsville, La., to Miss Tullie De Mahy, of New Orleans.

WALLACE-FLOURNOY.—At Richmond, Va., Dec. 26, 1882, by the Rev. Mr. Bledsoe, Mr. J. D. Wallace, agent and operator, Glade Spring, Va., to Miss Lebia Flournoy, of Richmond.

ELECTRICAL PATENTS ISSUED.

Week Ending Dec. 26, 1882.

Apparatus for suspending, raising and lowering electric lamps; Charles C Jennings, Buffalo, N. Y.	269,526
Conduit for electrical conductors; William B. Eltonhead, Philadelphia, Pa.	269,568
Dynamo-electric machine; Elihu Thomson, New Britain, Conn.	269,605
Dynamo-electric machine; Edward Weston, Newark, N. J.	269,761
Electric current meter; Alex. Bernstein, Boston, Mass.	269,559
Electric incandescent lamp; Edward Weston, Newark, N. J.	269,759
Electric safety apparatus for theatres and other buildings; Charles A. Mayrhofer, Vienna, Austria.	269,593
Electric telegraph transmitter; Emery M. Hamilton, New York, N. Y.	269,521
Electro-medical induction coil; Jerome Kidder, deceased, New York, N. Y.	269,794
Incandescent electric lamp holder; Edward Weston, Newark, N. J.	269,757
Insulating wires; Lewis H. McCullough, Richmond, Ind.	269,807
Printing telegraph; William J. Burnside, Lower Norwood, England	269,634
Regulator for dynamo-electric machines; Hiram S. Maxim, Paris, France	269,805
Regulator for dynamo-electric machines; Elihu Thomson, New Britain, Conn	269,605
Speaking telephone; George A. Fitch, Oakland, N. Y.	269,657
Suspending and circuit-controlling mechanism for arc lamps; Edward Weston, Newark, N. J.	269,758
Telegraph and telephone cable; John Speicher, New York, N. Y.	269,735

BUSINESS NOTICES.

If you want to become a telegraph operator send 25 cents to C. E. Jones & Bro., Cincinnati, for best illustrated instruction book.

We see by the official proceedings of the Ohio Mechanics' Institute, that their medal has been granted to Cumming & Brinkerhoff, of 219 East 18th street, New York, after a very severe trial of the Cumming Key in the Cincinnati, O., Western Union office. According to the committee's report, the key was worked steadily 18 hours a day for over five months, on their heaviest press wire, before decision was made. We quote:

"The testimony of operators handling the key daily is without exception favorable to it, on account of its easy motion and freedom from sticking. It has never, to our knowledge, been taken from its bearings for the purpose of improving its efficiency, which has continued to be satisfactory to the present time (Dec. 1st).

"We are led by these facts to conclude that this key is superior to the ordinary telegraph key, and that its superiority consists in the nature of the contact made by the peripheries of the revolving discs. This device may also be used with advantage in place of the ordinary contact points in other electrical instruments, where a circuit is made and broken.

"We recommend the award, in recognition of this invention, as an important advance in the construction of electrical instruments."

[Signed] S. M. DUNLAP, A. T. GOULD, C. E. JONES, W. B. MCMEEKIN, EDMOND OSMOND.

(Report adopted, confirmed, and O. M. Inst. medal awarded.)

All telegraphists, supply agents and superintendents desiring a perfect key, should send their addresses by postal card to Cumming & Brinkerhoff, 219 East 18th street, New York, and receive, postpaid, an 8-page illustrated descriptive circular, containing extracts from and references to some thirty prominent scientific publications in America and Europe; the full text of the Ohio Mechanics' Institute and Atlanta Exposition reports on the periphery contact disc electrodes; also names of several hundred operators, electricians and well-known experts, who have tested the keys and pronounced in their favor; besides giving cuts of the several instruments made with this attachment, and medals awarded this scientific invention in Paris, London, Atlanta, Cincinnati and New York. Send for the circular. Address as above.

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KERITE has been adopted and used instead of gutta-percha by the United States Government, the New York Central & Hudson River, Boston & Albany, Pennsylvania and many other railroads. By the Western Union, Mutual Union, Baltimore & Ohio and other Telegraph Companies; the American District Telegraph Companies: the various Telephone and the Electric Light Companies, and by the fire-alarm systems of sixty cities throughout the United States, and in all cases gives universal satisfaction.

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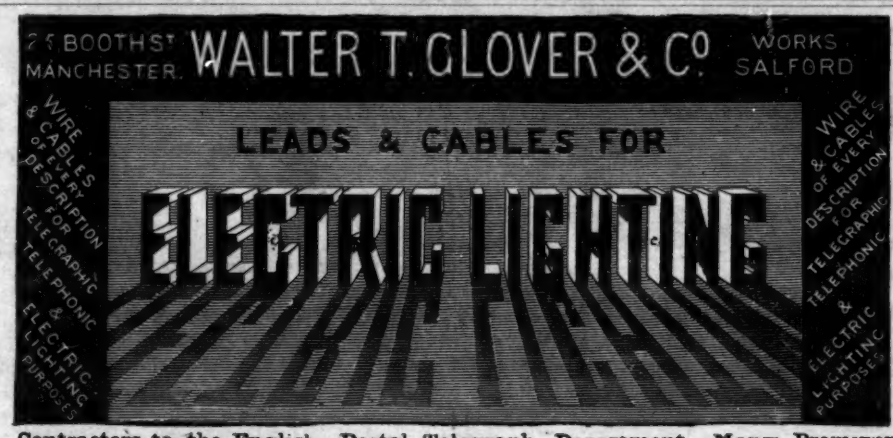
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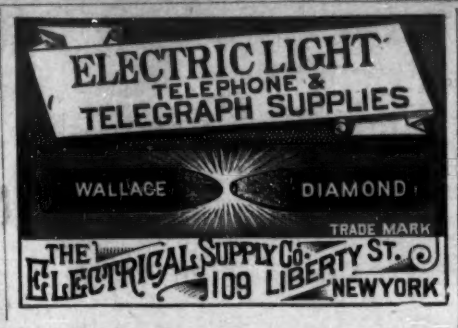

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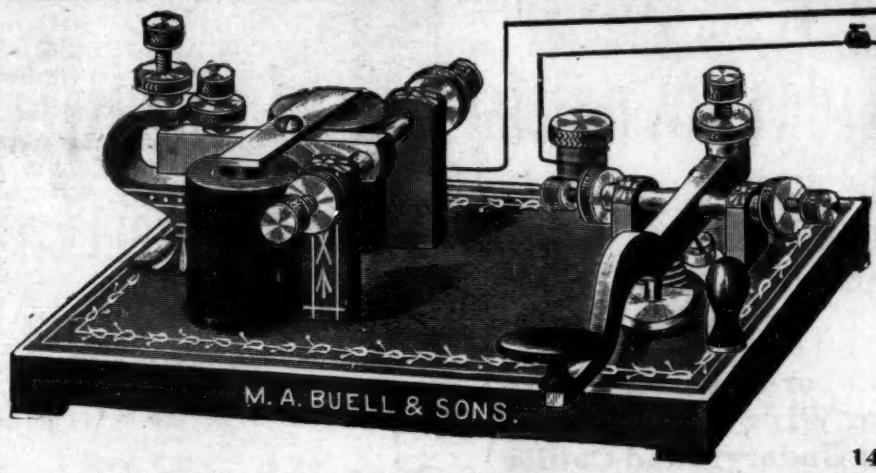

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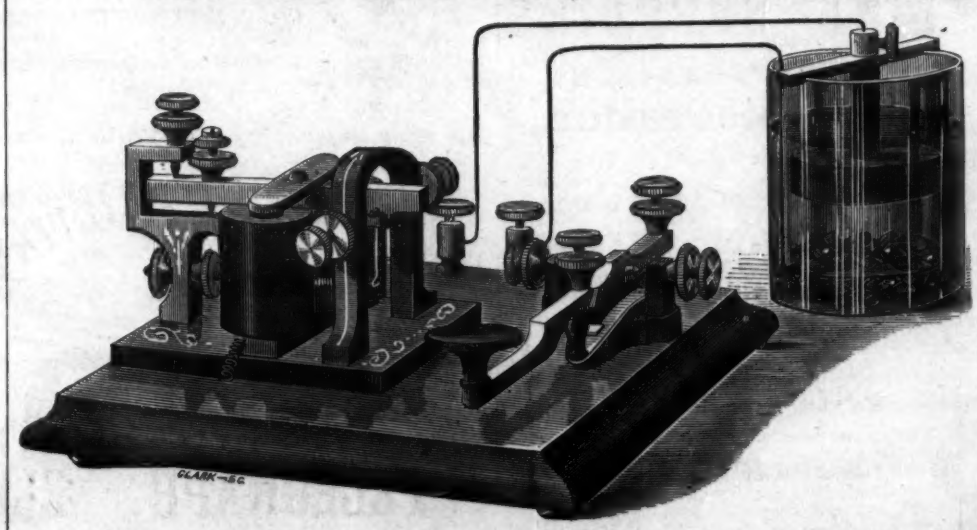

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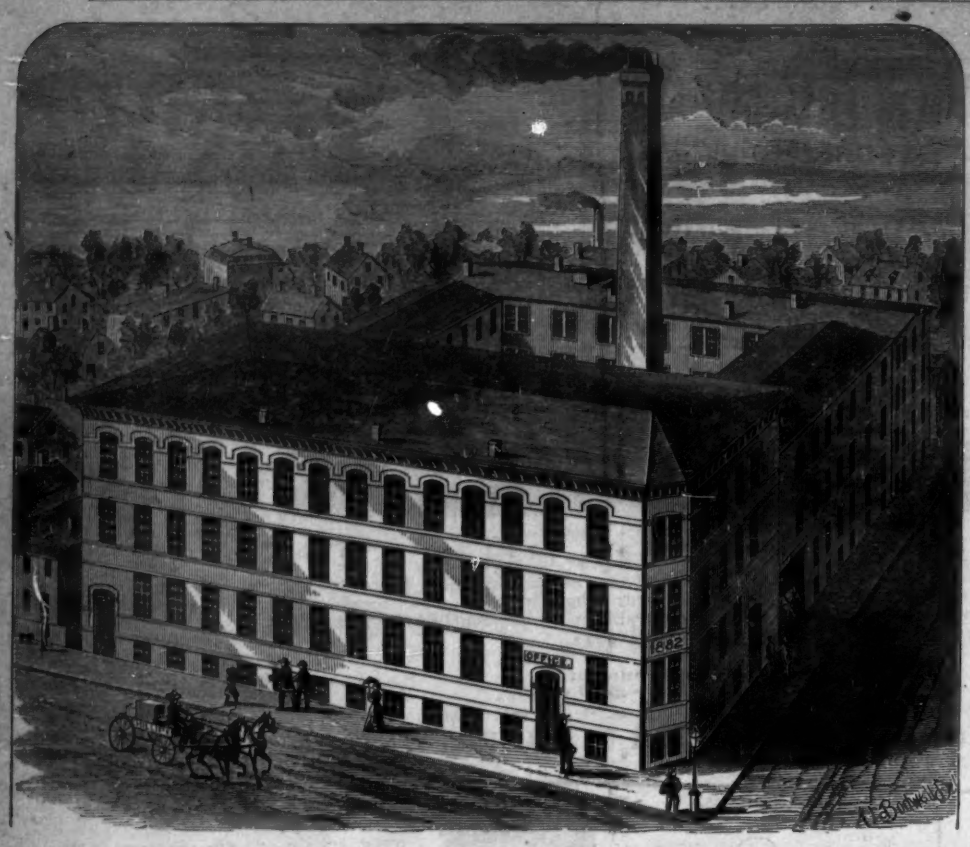

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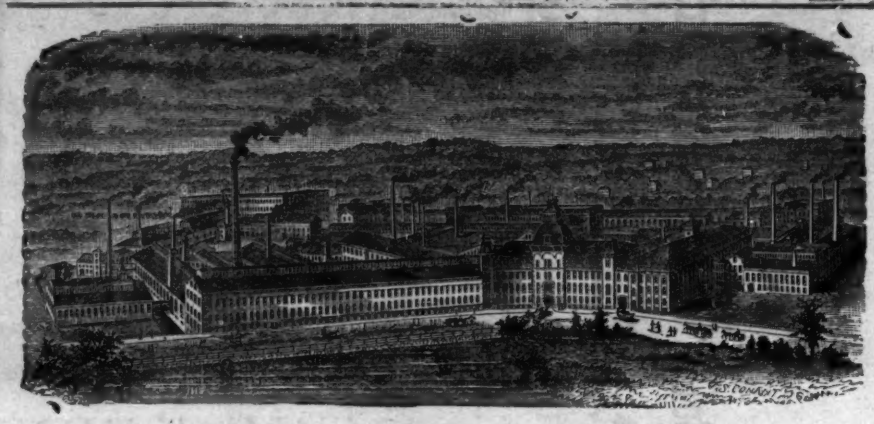

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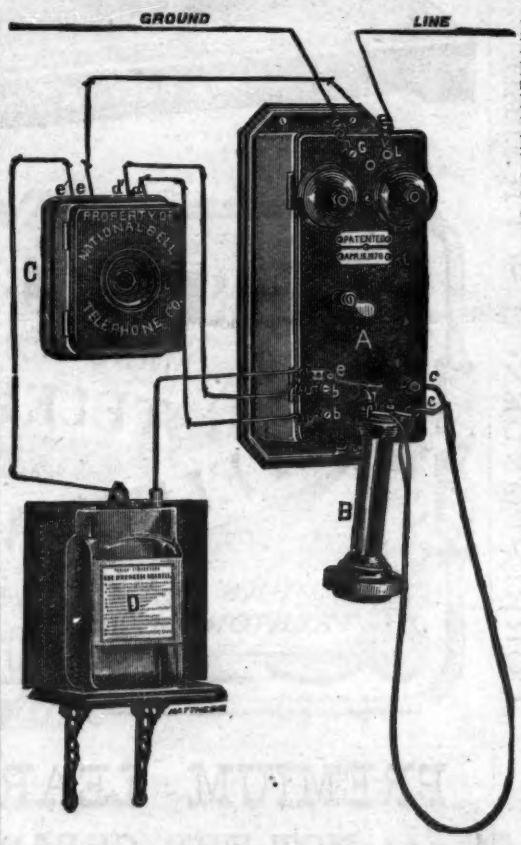

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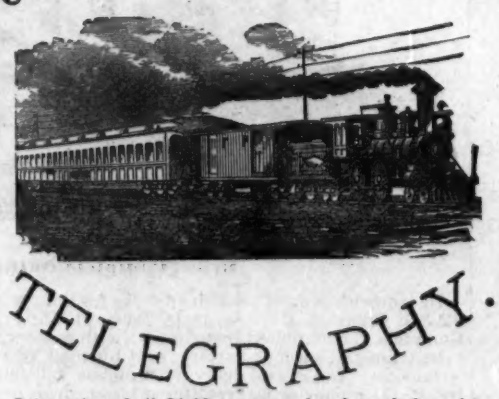

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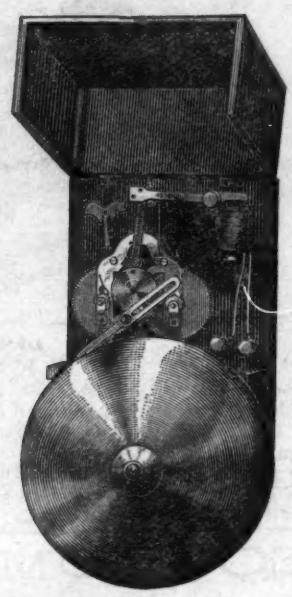

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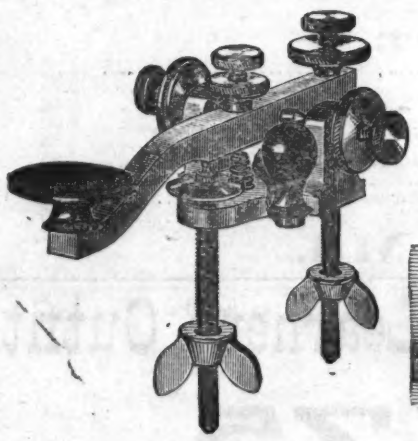

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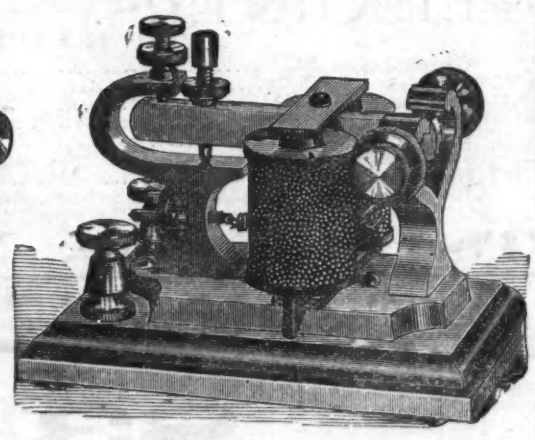

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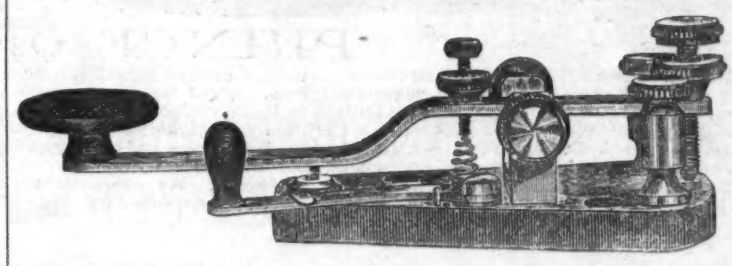

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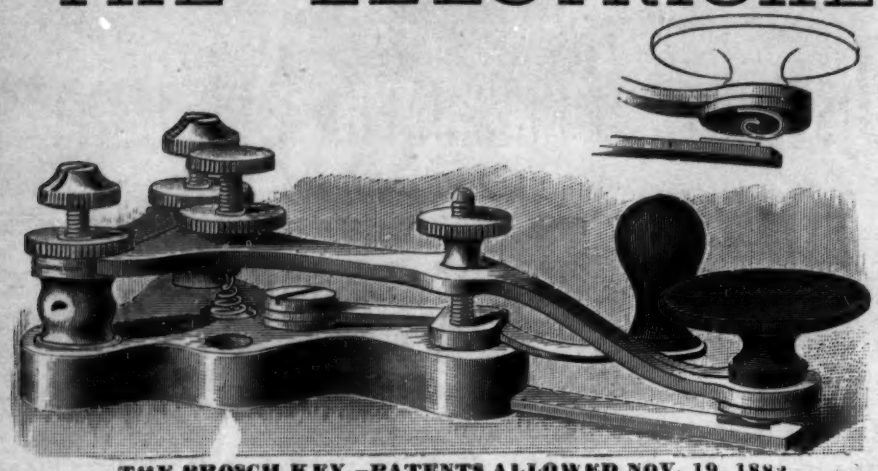

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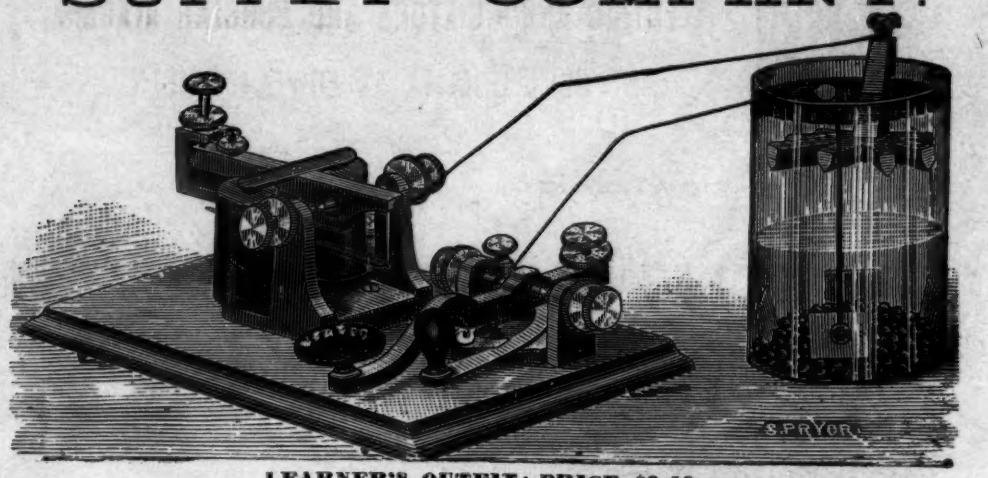

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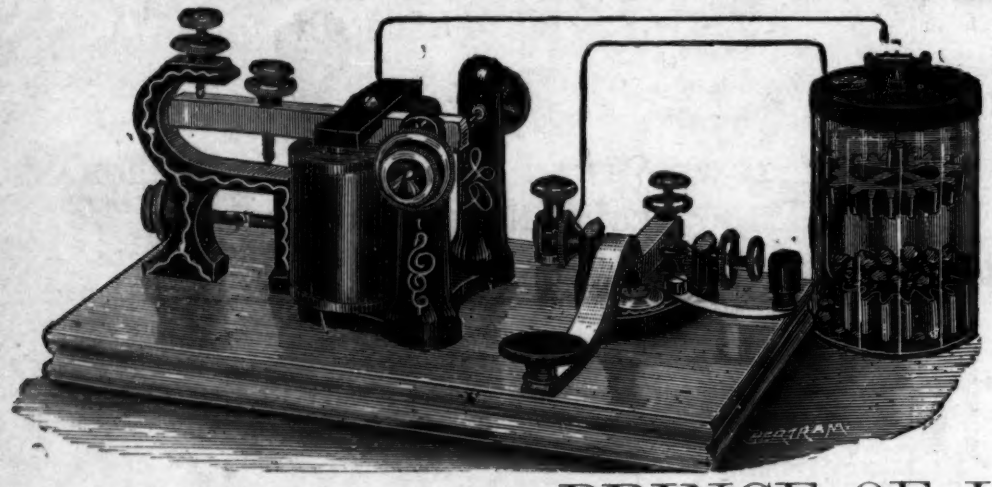

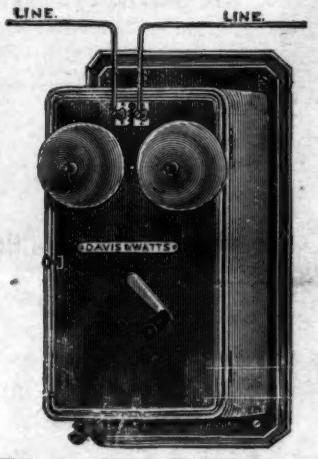

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The above beautiful outfit we unhesitatingly claim to be the best, at or near the price, in the market. A full-size sounder of great capacity and clearness of tone, curved lever key of improved construction, the whole substantially made and finished in best style, and mounted on a highly polished mahogany base. We make two styles. No. 1 is fitted with *highly polished brass* sounder and key levers and *hard platina points.* No. 2 has bronzed iron levers, and is presented to meet the views of those who desire a cheaper instrument, the same as supplied by other manufacturers. The Battery is of extraordinary power and constancy. We guarantee this outfit to be all we claim, and will return the money where satisfaction is not met with. Outfit includes chemicals, office wire and book of instruction.

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Instrument alone, No. 1	3.50
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Instrument alone, by mail, anywhere in U. S., post-paid	4.00
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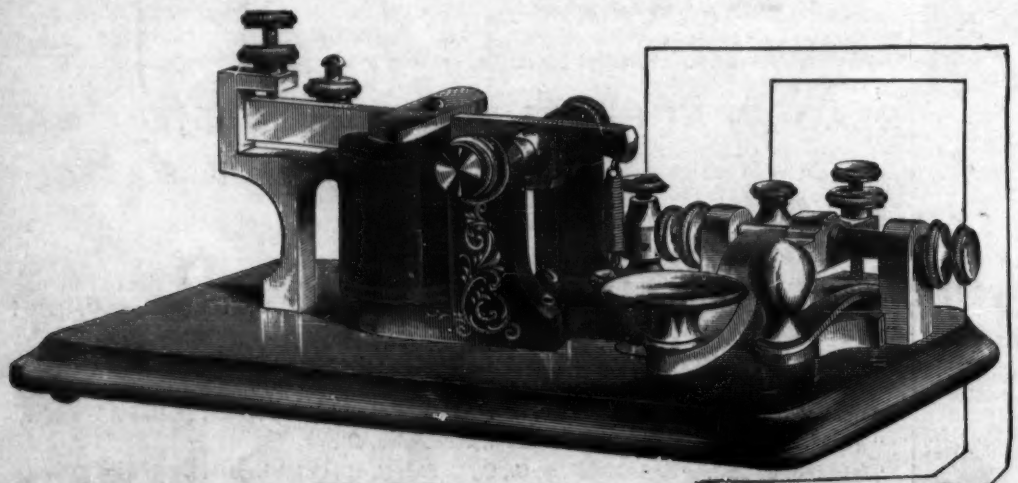

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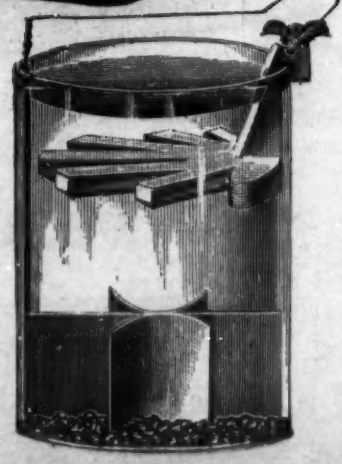

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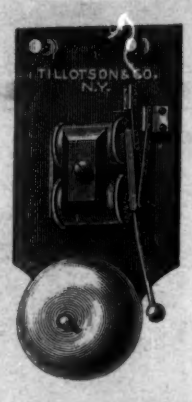

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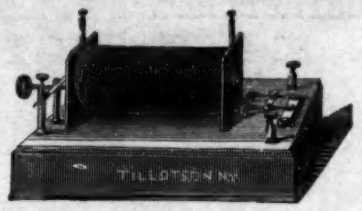

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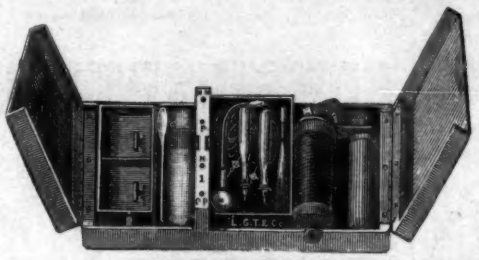

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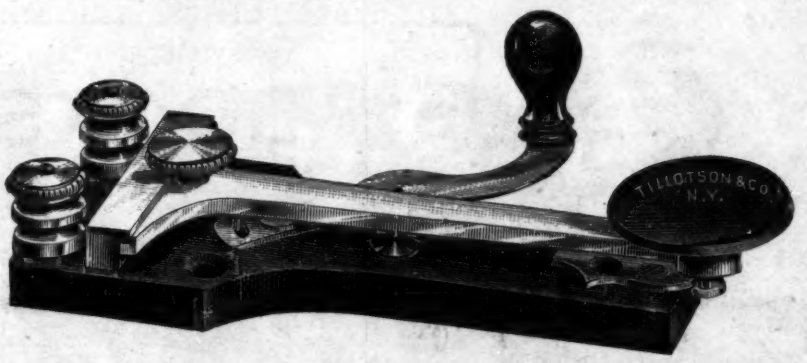

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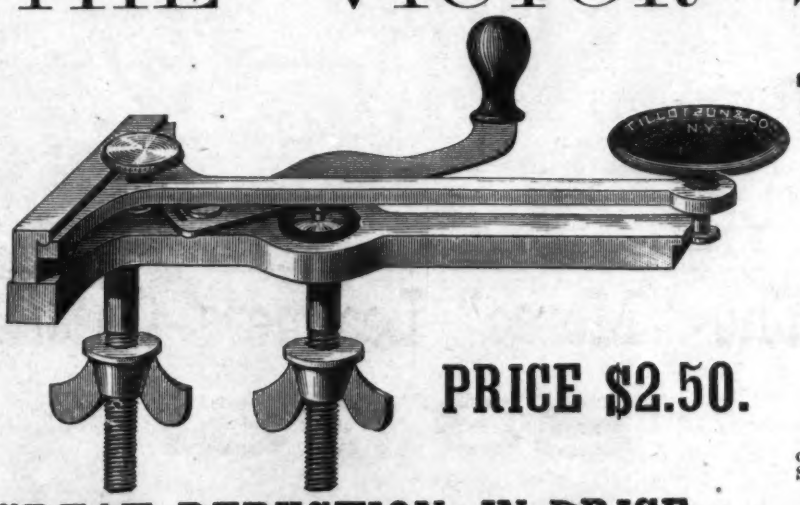

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To enable all to test the merits of this great invention, we will, on receipt of price, send, post-paid, by registered mail, to any part of the United States or Canada, a sample VICTOR KEY.

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Polished, 35c. per dozen.
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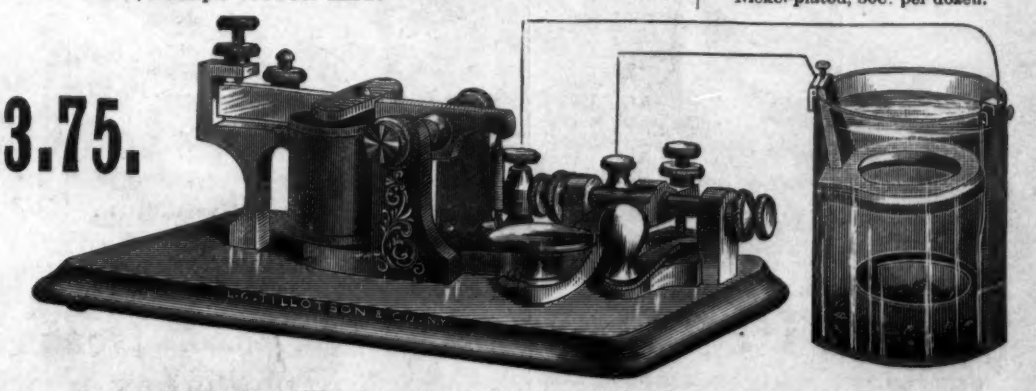

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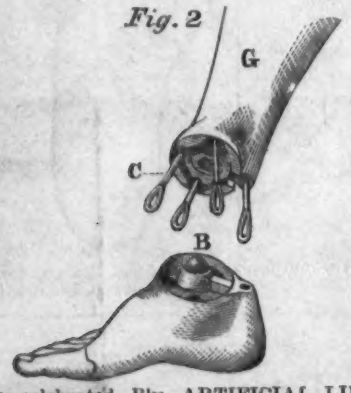

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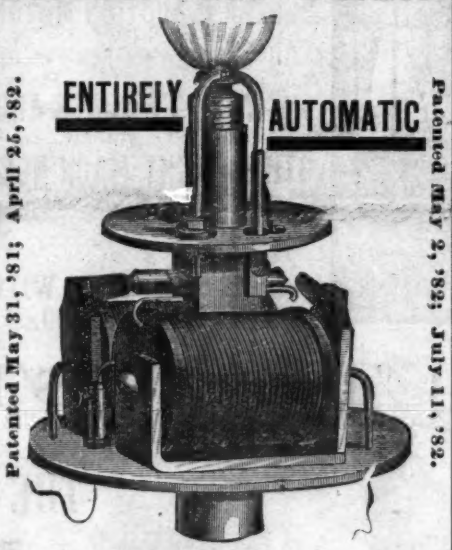

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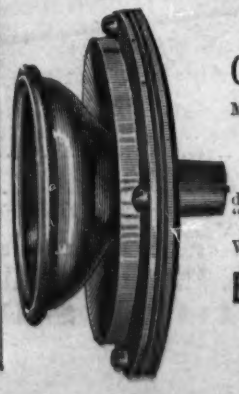

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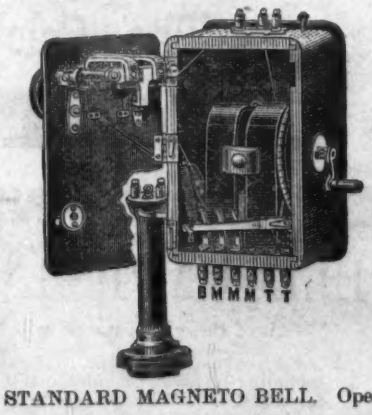

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